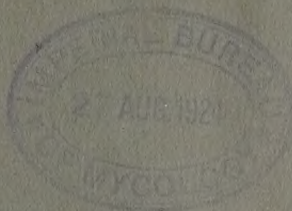


JAMAICA.

ANNUAL REPORT

OF THE



DEPARTMENT OF AGRICULTURE

FOR

THE YEAR ENDED 31ST DECEMBER, 1923.

Ordered by His Excellency the Governor to be Printed.



JAMAICA
GOVERNMENT PRINTING OFFICE, KINGSTON.

1924

DEPARTMENT OF SCIENCE AND AGRICULTURE

Report for the year ended 31st December, 1923.

Department of Science and Agriculture,

Hope, Kingston P.O.,

February, 1924.

Sir,

I have the honour to submit for the information of His Excellency the Governor, the Report of the Department of Science and Agriculture for the year 1923.

1.—GENERAL OBSERVATIONS.

Again the Colony suffered from lack of rain and the effect of two years of drought was felt in a cumulative degree.

The average rainfall for the island was 57.48 inches or 19 inches below the average for the previous half century. For 1922 and 1923 a cumulative deficit of 43 inches of rain was recorded. This expresses in brief the trying agricultural conditions under which the planters had to operate and it is indeed remarkable that despite such unfavourable conditions for production the Exports of the Island were so well maintained. The Collector General's return shows a value of £4,195,373 for the Exports in 1923 as against £4,037,371 in the previous year.

This favourable result was mainly due to the bananas which, despite very unfavourable climatic conditions, were in such eager demand that a total value of £2,265,116 was secured from about 12½ million stems of bananas. This is the record in the history of the Banana Industry of the Colony. I submit a table of the Banana Trade of Jamaica showing its fluctuations and present position over a period of 22 years:—

BANANA TRADE OF JAMAICA, YEARS 1920-1923, INC.

Years.	No. of Stems.	Total Value.	Average price per stem in Shillings.
1902	11,003,840	825,288	1.5
1903	14,184,375	1,134,750	1.6
1904 Hurricane Aug. 1903 ..	7,803,243	585,243	1.5
1905	8,903,739	514,191	1.2
1906	14,981,145	842,689	1.1
1907	16,009,662	880,531	1.1
1908	13,942,567	1,038,721	1.5
1909	14,612,881	1,044,821	1.4
1910	14,095,191	1,141,710	1.6
1911	16,497,385	1,456,582	1.8
1912	13,382,072	1,241,187	1.9
1913 Hurricane Nov. 1912 ..	11,597,888	988,236	1.7
1914	16,201,772	1,490,563	1.8
1915 Hurricane Aug. and September ..	8,156,860	599,529	1.5
1916 Hurricane August ..	3,499,565	222,497	1.3
1917 Hurricane September ..	2,394,514	227,479	1.9
1918 No competition in Trade ..	3,201,465	297,736	1.9
1919 Competition in Trade (September)	9,673,557	936,014	1.9
1920	9,037,028	1,333,865	2.9
1921	9,959,144	1,265,811	2.5
1922	12,713,849	1,699,366	2.7
1923	12,455,310	2,265,309	3.6
	244,307,052	22,032,118	
Average for 22 years ..	11,104,866	1,001,460	1.8

These figures show that the average output of bananas for export has been slightly over 11 million stems per annum with an average value of one million pounds Sterling and an average price of one shilling and eightpence per stem of bananas produced during the period of 22 years.

The records for 1923 show that the average price paid per stem was just double the 22 years' average while the total value was 2½ times the average for that period. A large amount of the profits of the banana growers during the past two years has been expended in extending their cultivations and enlarging their transport machinery. The output of bananas in 1924, with favourable weather conditions, will be five times that of the year 1918 when the output of fruit was only a little over 3 million stems. Competition in the trade is now very active and the growers in Jamaica have been receiving nearly double the price they were paid in 1918 before competition in the trade was effected.

Panama Disease was kept under very active control during the year and our staff of nine Inspectors was kept continually engaged throughout the year in carrying out quarantine measures under the "Order." It is satisfactory to note that the disease was thus so effectively controlled that the increase amounted to less than 6 per cent. over that for the previous year. With a disease of the nature of Panama Disease whose spread may readily gather momentum so as to cause a complete ruin of the industry in a short time when left to carry on its natural spread, such a result as has been recorded in Jamaica must be regarded as satisfactory and encouraging.

The original system of quarantine was devised by the writer when the disease was first discovered in Portland, in January 1912. At that time the true cause of Panama Disease was unknown, there was no Mycologist on our staff, and preventive measures had to be drawn up in the absence of scientific knowledge of the causative organism of the disease. Although many experiments have since been tried, the original procedure as laid down in the "Order" of 1912 still appears to be the most successful means of controlling Panama Disease and attempts to reduce the area of quarantine or to simplify the treatment have, so far, resulted in greater losses from disease in the end.

The secret of success in dealing with Panama Disease is prompt action on the first appearance of the disease. Any neglect inevitably results in a rapid spread of the trouble. The Department has had great difficulties to face in securing prompt measures on the lands of small cultivators who have been very apt to hide or ignore the disease thereby causing a number of foci to be established in a district.

A trial is now being made of a new banana which was brought from Guatemala by Mr. R. White of South Manchester in 1914. This has been proved to be immune to Panama Disease by a crucial test on a diseased area on the Junction Road in St. Mary. The fruit is being accepted readily by the Fruit Companies and is very similar to the "Jamaica" Banana in appearance. It remains to be found, however, whether the American market will accept this "Robusta" banana when shipped in quantity.

Two nurseries each of an acre in area have been established at Buff Bay and Hope. Some Seedling Bananas grown from seed sent by Mr. Dewar from Nigeria are now growing at the Hope Experiment Station. Arrangements have also been made to raise seedling bananas by crossing some seed-bearing species on the Jamaica and Chinese Bananas. This work was started at Hope by Mr. W. Fawcett when Director of Public Gardens in 1902, but the seeds failed to grow. The results recently obtained at the Imperial College of Agriculture at Trinidad show that it is possible to obtain seedling bananas by crossing seed-producing, inedible species with the "Gros Michel" of commerce. Now that the "Gros Michel" is failing as a commercial fruit due to Panama Disease, the question of raising an immune banana from seed has become a question of prime importance to all banana-producing countries. The position of Jamaica is peculiar in that the advent of an immune commercial banana that could be grown on immense areas in Central America at a very low cost would destroy its position as the leading banana country of the world. Planters in Jamaica are, therefore, viewing the outcome of this campaign in breeding new bananas with somewhat mixed feelings and are anxious that any new variety of value may be kept for the exclusive advantage of the Colony.

From the Departmental point of view the year has been chiefly remarkable for an active campaign against Mosaic Disease which threatened to become a serious menace to the canefields of the island. A full report on the campaign has been presented by the Superintendent of Agriculture in his report herein. This shows that the co-operation of the planters has been freely given and that effective control of Mosaic Disease is being rapidly effected in all the chief sugar-growing areas. "Uba" cane has proved to be of great service in this campaign as it is immune to Mosaic Disease and is a very strong and hardy grower giving a larger tonnage than any other cane grown in the island. The Sugar industry has found itself in the tantalising position of having a splendid market for its sugar and latterly a good demand for rum with a production seriously curtailed by three years of drought. The Estates in Vere have suffered most severely, despite great efforts to deal effectively with the inadequate supplies of water for use in irrigation. The exports of sugar in 1923 were about 26,000 tons valued at £675,000 as against 50,000 tons valued at £914,000 in the previous year.

Rum was greatly reduced in output by every means and only 5,370 puncheons were exported of a value of £51,765.

For the current year prices are still good for sugar while rum is in brisk demand. Many estates should now be able to see themselves on a safe basis after the tragedies of 1921.

At the Hope Experiment Station there are 35 seedling canes obtained by crossing the "Uba" with large West Indian varieties. It is hoped from this line of breeding to obtain for use in Jamaica, as has been effected in Java, a resistant cane that will enable planters to deal with Mosaic Disease in an effective manner and which will yield larger and more "planterlike" canes than the small reed-like "Uba."

The Small Settler has been found a hopeless person for dealing with Mosaic Disease by "roguing" and the only salvation of this class of cane cultivator will be the provision of an immune cane suitable to his requirements. An Order prohibiting the growing of corn (maize) in contiguity to sugar canes has been issued. It is important for the small growers to understand that Mosaic Disease is even more destructive to corn than to cane and that it is in the interest of corn as well as of sugar cane growers that those two plants be kept apart. The reason for this is that the corn harbours the carrier of the disease (corn aphid) while the cane supplies the virus for infecting both cane and corn. It has been found necessary to establish several new sugar cane nurseries in order to assist the campaign against Mosaic Disease. Owing to the generosity of the Custodes of Clarendon and Westmoreland who gave some of their best lands free for the purpose, large nurseries of sugar cane have been established in these two parishes.

Proposals for nurseries for Trelawny and St. Thomas have been approved and provision has been placed on the Estimates for 1924-25 for their establishment.

Although the lack of rain was detrimental to the coconut industry the output of nuts (including copra) was well maintained at 34 million as against 36 million nuts for 1922. Owing to an improvement in price the smaller crop of 1923 was worth £178,000 as against £167,000 for the coconut output of the previous year.

Latterly the coconut market has been active and much higher prices are now being contracted for this year's crop. The price of Copra has also recently responded to a keener demand. The outlook for Jamaica's coconut industry is therefore much changed for the better. There are many thousands of young trees still to come into bearing and with the improved position for coconuts many planters will find a successful outcome for their enterprise in having planted coconuts extensively during the five years previous to 1920.

A local soap factory for making a good common soap out of Coconut Oil has now been established and this will serve to prevent any local over-production of coconuts, as the local demand for soap would require every coconut grown in the Colony for its needs if a good, cheap article is produced in the Colony.

Coffee has had a very good year with an output of 3,800 tons valued at £232,000 as against 3,160 tons valued at £202,000 in 1922. This crop deserves more attention at the present time, particularly on the part of the Agricultural Instructors who work among the smaller cultivators. Coffee responds quickly to animal and vegetable manures on the limestone soils and doubtless efforts in this direction, if persisted in, would bring about a great improvement in the yield of the multitude of small coffee patches on which our exports of this staple now chiefly depend.

Cacao has passed through one of the worst years on record since it became one of our major articles of export. Over-production in the chief producing countries combined with under-consumption in Europe have brought about a serious condition in the cacao market. At the moment of writing, however, the price of cacao has suddenly taken a forward move and it is hoped that a better market has now been started.

The value of the exports of cacao in 1923 was only £60,000 as against about £140,000 in the previous year. Planters in Jamaica are at present waiting to see whether the cacao market will recover and are loth to destroy their cacao trees pending some sort of a settlement in Europe. It would be unwise to wait very long for, in Jamaica, the planting of bananas would at once enable the owner of an unprofitable cacao cultivation to earn good profits from his land, while if the cacao industry again become attractive it would only take a few years to replace the cacao trees which can be grown between the bananas at small cost.

Logwood as an industry, has been rather depressed. The value of logwood and its extracts for 1923 was £271,000 as against £361,000 in the previous year.

Pimento has remained in a dull state; 4,700 tons valued at £57,000 were exported as against 5,100 tons valued at £60,000 in 1922. Here again, the producers are faced with over-production and a bad European market. A settlement of Central European finance would at once react on Jamaica's pimento trade and lead to a brisk trade in this spice. A small commercial production of pimento leaf oil has been started in Manchester. The market for eugenol has recently improved.

Hides show an improvement on the previous year by an increase of 25 per cent. in quantity and value. The markets in U.S.A. and Canada have remained closed due to the Foot and Mouth outbreak. It is hoped, however, that the favourable outcome of the campaign against this disease will soon result in a re-opening of these markets for hides from Jamaica.

Tobacco and Cigars show some improvement as represented by an increase in value from £60,000 to £70,000. If the proposed Imperial Preference be granted by the British Parliament the growing of tobacco in Jamaica should become a planter's enterprise. Hitherto the tobacco industry has been mainly a small man's enterprise and not profitable to a capitalist by the direct employment of labour. The local cigarette is beginning to gain somewhat over the imported article by the manufacture of better and more attractive brands of native cigarettes.

Ginger is wholly a small cultivator's crop and whenever attempts have been made to grow ginger on a plantation scale the market has at once fallen with the increased supplies. The year under report was an excellent year for ginger growers in Jamaica who received £113,000 for 850 tons of ginger as against £90,000 for 650 tons in 1922. Various foreign countries have noted this useful little trade and many enquiries for plants of the choicest Jamaica Ginger have been received. The planters, however, wisely refuse to sell their ginger plants for export. In view of the fact that the market is so limited it would be no benefit to any foreign country to compete with Jamaica in producing this crop which is so well suited to the genius of our peasantry as directed to their favoured ginger lands.

Annatto is another small man's crop that has recently come into some prominence. Although the crop was only 60 per cent. of that of 1922 a return of over £11,000 was obtained for annatto as against £9,000 in the previous year. Agricultural Instructors could with advantage encourage some extension of Annatto cultivation among small settlers, as the market appears to demand larger supplies of this excellent butter-colouring material.

Cotton after a depressing fight extending over 20 years, has dwindled to the small dimensions of 300 lbs. It is clear that cotton is a troublesome crop to grow in Jamaica and can not compete with our other staples as a source of profit. My advice to this effect given sixteen years ago was criticised at the time but has since been found to be sound. Great care has been taken to exclude foreign cotton so as to keep out the "Boll Weevil" and the "Pink Boll Worm," two pests that are fatal to the free extension of a cotton industry. Jamaica has, therefore, been preserved as a virgin area for the development of cotton as soon as a variety suitable for our conditions which will return adequate profits to the grower has been introduced.

Rubber is another article of tropical production that I advised planters in Jamaica not to invest their money in some 16 years ago. Experience has shown that in Jamaica *Hevea* grows slowly and fails to yield latex in paying quantities. *Castilloa* grows well but is a failure as a cultivated source of rubber. *Ceara* and *Funtumia* rubbers have been quite useless as rubber producers in Jamaica. It must therefore be admitted that Jamaica has no pretensions to be a rubber-producing Country.

Citrus Fruits have shown some recovery during the year. Oranges increased from 83,000 boxes to 100,000 boxes while grapefruit increased by $\frac{3}{4}$ of a million fruits.

Orange Oil also showed an increase amounting to £18,000 for the year. Producers of citrus fruits are eagerly awaiting some security of market and of transport which would justify them in cultivating and extending their orchards. So far, it must be confessed that the citrus trade of Jamaica, since it lost free entry into the United States market, has been far from satisfactory. Many planters have lost money and most growers have been greatly disappointed at the financial outcome of their production of citrus fruits.

Honey has prospered with an export value of £19,000 as against £11,000 in the previous year. The result of the drastic destruction of all hives within 3 miles of Kingston harbour in 1919, when "Foul Brood" gained entry into the hives in this area through the transshipment of foreign honey infected with "Foul Brood" in the Port of Kingston has now been proved to have been a complete success. The disease was completely stamped out before the bees had time to escape to the hills and thus gain an impenetrable citadel for the extension of the disease throughout the Colony. Although the cost of this campaign appeared high at the time, this was probably one of the best investments ever made by the Colony in dealing with an introduced disease, for it is estimated that the loss in honey would have been about 25% per annum if 'Foul Brood' had established itself in Jamaica, or an annual loss of about the original cost of the first sacrifice.

Tick Destruction.—During the year 41 dipping tanks were registered with the Department bringing the number of registered dipping tanks constructed under the Order of 1922 to a total of 227.

There are a certain number of defaulters who have failed to comply with the Law and steps are now being taken for some educational prosecutions to be instituted against flagrant offenders.

The Laboratory supplied 25 tons of paranaph and arsenite of soda to stock owners during the year, equivalent to nearly one million gallons of cattle dip. Testing outfits, testing tables and the necessary chemicals have been regularly supplied so that owners of dipping tanks can test their dip and keep it to the correct strength.

It is estimated that this service saved the penkeepers £2,300 during the year over the cost of standard commercial dipping materials. The present "Order" only covers the case of owners of over 100 head of cattle and it will shortly be necessary to deal with the smaller herds by "Community Tanks" erected by Government or public authorities at convenient centres, and to be paid for by a fixed charge per head per annum for each animal in the area which is brought under the Dipping Order.

If a tax of 4/ per head per annum were authorised, a large number of "Community Tanks" could be constructed so as to bring in revenue while serving to clear the country of the tick pest. The effect of the elimination of ticks from cattle pens has been an immediate speeding-up in the growth of young cattle, quicker breeding of the cows and fewer losses of calves. The output of the island's breeding herds may be safely set at an increase of 25 per cent. per annum as a result of the policy of compulsory dipping which has recently been instituted. The effect on milch cows is even more remarkable and it may be accepted that with the establishment of dipping tanks a native dairy industry has now become a business project.

The experiments with Condensed Milk at the Government Laboratory have shown that excellent condensed milk can be made in Jamaica and that milk will travel safely on the railway if heated to a pasteurising temperature and transported in insulated containers. In 1923 Jamaica spent £120,000 on the importation of 80,000 cases of Condensed Milk. If this money were kept in the Colony our cattle breeders, who are at present in depressed circumstances, would emerge into a state of comparative affluence.

The Stud Farm at "Grove Place" passed through a trying year due to drought and shortage of feed and water. The quarantine against Foot and Mouth Disease in the western parishes also reacted against the free use of the Stud Farm by the public. The stallion "Water Jacket" having served for 15 years in Jamaica is now at the end of his career and we shall need a good thoroughbred stallion next year. Racing owners state that in view of the Government having received £20,000 for Entertainment Tax from race meetings that there is a moral claim on general revenue for the provision of a good stallion to keep up the standard of local thoroughbred horses.

The new Silo and circular water tank have been erected. The Dairy building, engine room and machine sheds, stover wind-mill and concrete tank for service at the "railway" well are now in hand for erection.

The Board of Management have been most helpful and I desire to record my appreciation of the earnest efforts of the members of the Board to help us in establishing "Grove Place" on a good business basis.

The nucleus of our future for the Farm lies in the 160 dairy heifers that we have bred in the past three years from which our herd of dairy cows is to be established.

The Hope Farm has had another trying year of drought but thanks to the energy of the staff we were so fortunate as to secure 550 tons of excellent guinea corn silage in December, while a large field of 11 acres has been established in "Uba" canes that look very promising as a source of fodder.

Despite the dry weather the Farm broke the record for milk production with an average daily yield of 314 Imperial quarts for the year 1923. Some very promising young stock have been reared at Hope and the standard of the herd has been greatly improved by a free drafting of all animals below a certain standard. Great hopes are raised by the promising appearance of the daughters of the Indian Montgomery bull "Pusa." This breed has not yet been tested in the West Indies and it would appear to be a valuable introduction.

The Sisal Industry has now reached the stage of producing regular supplies of fibre for export. Jamaica Sisal sold as high as £37 10s. 0d. per ton in New York, while the Rope Factory at May Pen has been in steady operation and is producing a very strong and useful rope for local use.

The Factory at Lititz after a trial run in which 50 tons of fibre was manufactured, was shut down in June owing to the leaves from the younger plants being too short for producing No. 1 Sisal.

Owing to three years of drought in their early career the young fields that were expected normally to come in for reaping in 1923 have had to be held over until they have made proper growth. The engine was out of adjustment and gave constant trouble. The baling press supplied by the manufacturers was too small for baling our Sisal and has still to be altered to suit the requirements of the Factory.

Difficulties also arose over the checking of leaves and a good deal of clean fibre was pilfered by the operatives. The Management was found to be incompetent and it was decided to shut down the Factory until the supply of leaves was adequate and a new management had been organised.

Expenses have now been cut down to a very low figure, until the Factory is again ready to operate. It was found that there were legal difficulties in operating loans under the Agricultural Loans Law and a special Law to authorise such loans has now been introduced into the Legislature.

There are about 800 acres of land suitable for Sisal immediately to the north of the Factory that it is hoped the Lititz people will plant themselves in Sisal for sale to the Factory.

The Loans are to assist in this enterprise. Although this first experience has been disappointing, it is satisfactory that the fibre was saleable at a very good price. When the 1,100 acres of the plantation are ready for harvest the Factory will be operating at full pressure and constant employment will be provided for 300 to 400 people in this distressed area.

II.—PUBLIC GARDENS AND NURSERIES, 1923.

REPORT BY THE ACTING SUPERINTENDENT OF PUBLIC GARDENS.

1. HOPE GARDENS.

Orchids.—The orchid collection maintained in the Gardens was greatly improved by the addition of over two hundred Cattleyas, Laelia Cattleyas, and many other specimens of orchids which had not been included in the collection at Hope for many years. Excellent growth was developed among the various specimens during the past year and a high percentage of orchids flowering in their seasons was maintained. The Director of the Missouri Botanic Gardens, St. Louis, Mo. kindly presented to the

Gardens an interesting collection of plants among which were plants of *Cattleya Trianae*, *Cattleya Schroederiae*, *Cypripediums*, etc.

A choice collection of *Cattleyas* and *Laelia Cattleyas* was imported from England. The plants arrived in excellent condition and very satisfactory growth has been developed since they were set out in their natural surroundings. Most of the old box structures around the trees in which orchids were grown and which were very unsightly in appearance have been removed and replaced by mesh-wire structures. It is confidently anticipated that within the next few months a very choice exhibit of blooms from our hybrid *Cattleyas* will be displayed in the Gardens.

Rose Garden.—The work of double trenching and replanting the beds was continued whenever labour could be spared to carry out this extra work. Ten beds were thoroughly trenched two feet deep, well manured, and planted again with the Maman Cochet Rose. These beds are now well established and are supplying quantities of cut blooms for sale. Several beds to the east of the Rose Garden in which are planted various varieties of roses, i.e., J. J. L. Mock, Laurent Carle, Helen Good, Etoile de France, and Souvenir de Pierre Notting, made a pleasing contrast with their varied colours in comparison with the large quantity of the pink and white flowers of the Maman Cochet rose which, on account of its adaptability to our somewhat harsh conditions at Hope for rose culture, is now being grown extensively in the Rose Garden. Several hundred rose plants were imported from America to meet the public demand for new varieties.

Succulent Borders.—The succulent border to the west of the Gardens was overhauled thoroughly and replanted with an interesting collection of Cacti and other allied plants. Several native species which were not included in the garden collection were obtained about the Island for setting out in this part of the Gardens. Included among these were some fine specimens of the "Turk's Head" Cactus (*Melocactus communis*). The peculiar growth of this plant is attracting considerable interest from visitors as they enter the Gardens by the central drive.

Ornamental Borders and Beds.—Cutting back of flowering and foliage shrubs was attended to in season. Overgrown shrubberies were cleared and replanted with an improved selection of flowering shrubs. Forty beds along the main drive were opened up and prepared for growing a selection of annuals. The exposed position of these beds allows for the growing of only a limited number of varieties therefore our selection was confined to such varieties as could stand full exposure to the sun. Petunias, Salvias, Phlox Drummondii, Zinnias, Cosmos, Coleus, Gomphrena, Aster amellus, Alyssum, and Geraniums did remarkably well, their bright colours adding much to the appearance of the Gardens from November to May.

Bougainvilleas.—The old trees of Oleanders which were growing in the half circular bed facing the north side of the office were removed to allow for the planting of the Bougainvillea Rosa Catalina. Every effort is being made to propagate this rare variety but up to the present time only a few plants have been obtained by different methods of propagation. In the meantime this bed has been planted with Cannas until a sufficient number of the Rosa Catalina plants has been obtained to fill the bed.

The three seedlings obtained in 1922 by crossing the 'Ruby' with the 'Rosa Catalina' have not yet flowered.

Plant Houses.—Special care was given to the upkeep of the Plant Houses so that at all seasons of the year a good display of pot plants was maintained as a feature of the Gardens. Very creditable specimen plants of Anthuriums, Alocasias, Caladiums, Begonias, Ferns, etc., have brought up our collection of pot plants to a much higher standard. This has been maintained by prohibiting the sale of large specimen plants from the Gardens.

Nursery.—The 'New Nursery' was considerably extended to meet the increasing demand for ornamental and economic plants. Two hundred extra feet of $\frac{3}{4}$ " piping were laid down to facilitate the watering of the propagating beds. A large variety of plants in bamboo pots was always in stock to meet the demands of the public.

Pastures and Fences.—The pasture lands under the care of the Gardens were kept clear of young bush and all necessary repairs to fencing attended to when required.

Repairs.—Extensive repairs were carried out on No. 4 Plant House, the whole wooden structure having completely decayed after standing for many years. General repairs to garden shelters, benches and pergolas were also attended to.

Distribution of Economic Trees.—There has been a great demand for economic trees from the Gardens this year, 18,746 plants being distributed free. Of this number 7,649 were distributed by Mr. A. P. Hanson, Agricultural Instructor for St. Andrew, to the settlers in the Port Royal Mountains for purposes of reafforestation, etc. The money voted for the free distribution of economic trees is quite inadequate to meet the demand which is increasing every year.

The following is a list of plants distributed by Mr. Hanson:—

Cedar	..	..	..	600
Mahoe	..	..	..	500
Mahogany (Native)	..	..	..	1,300
do (British Honduras)	..	..	..	250
Braziletto	..	..	..	700
Breadnut	..	..	..	500
Podocarpus	..	..	..	200
Cacao	..	..	..	88
Nutmeg	..	..	..	230
Sarsaparilla	..	..	..	6
Orange	..	..	..	1,600
Grapefruit	..	..	..	1,200
Tangierine	..	..	..	475
				7,649

PLANTS DISTRIBUTED FROM HOPE GARDENS, 1923.

Sold.

Economic Plants—				
Cacao	..	..	..	104
Citrus	..	..	..	727
Nutmeg	..	..	..	328
Eucalyptus	..	..	..	308
Misc. Fruit and Economic Plants			..	2,057
				3,524
Ornamental Plants	..	..	..	22,168
				25,692

Free Grants.

Economic Plants—				
Cacao	..	..	..	116
Citrus	..	..	..	3,282
Nutmeg	..	..	..	550
Eucalyptus	..	..	..	25
Cane Tops and Cuttings	..	..	..	225,116
Misc. Fruit and Economic Plants			..	14,673
				243,762
Ornamental Plants		..	..	6,555
				250,317
Total number of Economic Plants	..	..	..	247,286
Total number of Ornamental Plants		..	..	28,723
Total number of plants distributed	..	..	..	276,009

The following statement shows the distribution of plants for the last three years from the Nursery at Hope:—

	1923.	1922.	1921.
Cacao	220	868	3,862
Citrus	4,009	4,460	4,331
Nutmeg	878	651	629
Eucalyptus	333	291	504
Cane Tops and Cuttings	225,116	426,449	141,547
Misc. Fruit and Economic Plants			
including Timber trees	16,730	10,377	7,970
Ornamental Plants	28,723	24,366	20,207
		276,009	179,050

Meteorological.—Hope Gardens, 668 ft. altitude.

The mean temperature is 76.2°F. and the average annual rainfall is 52.86 inches for 43 years. The mean temperature for 1923 was 78.5°F. and the total rainfall was 38.10 inches as follows:—

1923.		Inches.
January	..	1.49
February	..	0.72
March	..	0.60
April	..	3.37
May	..	13.87
June	..	0.43
July	..	0.88
August	..	1.95
September	..	2.75
October	..	9.89
November	..	1.23
December	..	0.92
Total	..	38.10

2. CASTLETON GARDENS.

Water Lily Tank.—The Lily Tank was emptied and cleaned out, refilled with fresh compost and replanted with *Nymphaea* and a young plant of the *Victoria regia*.

Mangosteen.—The mangosteen tree (*Garcinia mangostana*) produced a large number of fruit during the early part of the year. One hundred plants have now been planted out on the hillside to the west of the Garden.

Fernery.—The old plant sheds had reached such a stage of dilapidation that they could not be repaired. These were removed and a rockery made on which ferns have been planted.

Beds and Borders.—A large number of flowering shrubs were planted through these borders to fill up the gaps that had appeared owing to several old shrubs having been dug out. General pruning and manuring were done when necessary.

Routine Work.—The usual routine work of billing lawns and slopes, pruning shrubs, opening drains, forking and weeding beds and propagating plants was regularly attended to and the garden was kept in good order throughout the year.

Walks.—The walks through the gardens were getting into bad condition due to the heavy rains which occurred in the Castleton district. Several hundred barrels of gravel were brought up from the Wag Water River for gravelling the walks.

Repairs.—The rest houses were repaired and painted. New benches were made to replace those that were beyond repair and others were repaired and painted.

Fences.—The fences on the two sides of the road leading through the Gardens were in bad condition. These have been repaired and the gates leading into the gardens painted.

PLANTS DISTRIBUTED FROM CASTLETON GARDENS.

Sold.

Economic Plants	..	..	..	73
Ornamental Plants	..	..	..	941
				1,014

Transferred to Hope Nursery.

Economic plants	..	..	..	792
Ornamental Plants	..	..	..	19,788
				20,580

Total number of Economic Plants	..	865
Total number of Ornamental Plants	..	20,729
Total number of Plants distributed	..	21,594

Meteorological.—Castleton Gardens, 496 ft. altitude. The mean temperature is 75.3°F. and the average annual rainfall is 117.46 inches for 50 years. The mean temperature for 1923 was 73.5° F. and the total rainfall was 100.93 inches as follows:—

1923.	Inches.
January	20.03
February	5.42
March	2.10
April	10.28
May	11.37
June	1.42
July	1.81
August	2.70
September	8.14
October	14.46
November	7.56
December	15.64
Total	100.93

3. PUBLIC GARDENS, KINGSTON.

The work of overhauling and replanting the borders was completed during the past year. Regular watering and heavy mulching with stable manure kept the plants in very healthy condition throughout the long period of drought.

Cannas.—The Canna beds in the centre of the Park were to be seen flowering very freely, their bright colours giving the Park a very attractive appearance during each season of the year. These beds were dug out 2 feet deep in February and many loads of stable manure used in preparing them for the plants. As a result of such liberal treatment of the soil excellent growth has been obtained.

Fences.—Several chains of fencing originally erected for the protection of the lawns, etc. from goats had reached such a stage of dilapidation that it was considered advisable to remove all the fencing rather than incur heavy expenditure on repairs as the fencing was answering no practical purpose since the Park had become free from the goat nuisance. In removing the fencing care was taken of the best material which was used for enclosing the band stand, a spot that had remained for many years a barren piece of land. The enclosed land is now a well kept lawn and along the fencing young plants of *Cassia fistula* have been set out. When in bloom these trees should make quite a distinctive feature in the Victoria Park.

Pathways to the east of the Park were defined and low fencing erected. In the past the public were in the habit of making unsightly tracks over the lawns. This has now been stopped and the bare patches planted with grass. Every effort is being made to maintain the lawns in a fresh condition during the protracted droughts in Kingston.

Pathways.—The condition of the walks in the Park still remains very bad. It will be impossible to bring the appearance of the Park up to a desired standard as long as the walks remain in such an untidy state of repair.

Removal of Trees and Palms.—A number of trees and palms that had grown unsightly were removed from the Park. In place of these a good selection of young flowering trees suitable for the dry plains have been planted through the Park.

Oleanders.—A large bed was opened up at the east entrance to the Park and planted with some excellent specimen plants of Oleander received from Hope Gardens.

Bougainvillea.—Groups of the 'Ruby' Bougainvillea have been planted about the lawns. This variety is proving a more vigorous grower compared with Bougainvillea spectabilis, var. lateritia, in the Kingston Gardens, therefore, on account of the attractive colour of the 'Ruby' variety, together with its vigorous growth, much use can be made of this plant in giving the Park a brighter appearance during several months of the year.

Street Trees and Gardens.—General pruning of the street trees (*Cassia siamea*) was regularly attended to. The rapid growth of the trees constantly demands a great deal of labour from the Victoria Park to keep the trees in bounds. Palms were planted in vacant spots in the King Street Gardens. Regular attention was always given to the watering of the lawns and palms around the Public Buildings.

Memorial Square.—The lawns and beds around the Cenotaph in the 'Memorial Square' were maintained in good condition. A retaining wall was recently erected by the Public Works Department around the Square. This wall has much improved the general planning of the Memorial Square and also answers a useful purpose as a permanent protection for the boundaries of the lawns which always showed a bare appearance previous to the erection of the wall.

Meteorological.—Victoria Park, 60 ft. altitude. The mean temperature for 33 years is 78.1° F. and the average annual rainfall for 45 years is 29.60 inches. The mean temperature for 1923 was 79.6° F. and the total rainfall was 21.11 inches as follows:—

1923.		Inches.
January	..	0.60
February	..	0.50
March	..	0.75
April	..	1.00
May	..	4.34
June	..	0.40
July	..	0.50
August	..	0.65
September	..	0.30
October	..	10.42
November	..	1.35
December	..	0.30
Total	..	21.11

4. HILL GARDENS.

Rose Garden.—The rose garden has always been a recognised feature in these gardens. At all seasons of the year masses of blooms are to be seen covering the bushes. New varieties are imported from time to time to replace old bushes and also to take the place of varieties that are now considered of very poor merit compared with recent introductions. Twenty-five selected varieties budded on briar stock were obtained during the year under review for the gardens. These have been set out in specially prepared beds where they are making very good growth.

Planting Trees, etc.—A large number of young pine plants (*Pinus Massoniana*) were planted along the pathways leading to the gardens. Four plants of Rhododendron were planted in the borders around the lower lawn.

Routine Work.—The usual work of weeding and forking borders, billing and mowing lawns, was constantly attended to.

Repairs to Greenhouses.—Minor repairs were carried out on the plant houses by the Public Works Department.

Meteorological.—Hill Gardens, 4,900 ft. altitude. The mean temperature is 62.5° F. and the average annual rainfall is 98.25 inches for 53 years. The mean temperature for 1923 was 63.3° F. and the total rainfall was 67.60 inches as follows:—

1923.	Inches.
January ..	12.56
February ..	3.09
March ..	1.61
April ..	7.98
May ..	10.03
June ..	0.86
July ..	0.57
August ..	1.48
September ..	3.53
October ..	13.93
November ..	5.87
December ..	6.09
Total	67.60

5. KING'S HOUSE GARDENS.

Rose Garden.—The Rosary suffered very severely during the early part of the year from the effects of a large grub which attacked the roots of the plants causing them to wilt and die in a very short time. It became such a menace at one time as to cause anxiety for the future maintenance of the Rose Garden. However, by constant searching for the pests it was possible to reduce their numbers to such an extent as to allow for the planting of young plants again. These have now grown into strong bushes giving the rose garden its previous attractive appearance.

Orchids.—The orchid collection includes some very choice specimens which came into bloom during the course of the year. The plants are in very healthy condition and every effort is made to keep the collection in its present healthy state.

Lawns.—The lawns have been much improved chiefly to the west of the gardens where, in past years, the unsightly hay grass (*Sporobolus indicus*) was allowed to grow to seed. This stretch of lawn is now regularly billed and mown with the machine thus extending the lawns for a much longer distance around the Governor's residence.

Kitchen Garden.—Regular sowings of vegetable seeds maintained a good supply of fresh vegetables for the Governor's household.

Pinery.—An excellent pinery is now established in the kitchen garden.

Pastures and Fences.—Billing and clearing of the pasture lands adjoining the gardens was attended to when necessary. Repairs to fences were undertaken by the Public Works Department.

Routine Work.—The general work of pruning shrubs, weeding borders, clearing and repairing pathways, was regularly attended to.

6. GORDON TOWN GARDEN.

A gardener from Hope Gardens was sent every fortnight to keep this small garden tidy.

7. THE BATH GARDEN AND NURSERY (ST. THOMAS).

Mr. H. G. Coote, Inspector of Plant Diseases, who is in charge of this garden reports as follows:—

The garden has been entirely remodelled and presents a new appearance. New pathways have been made and flower plants and shrubs re-arranged. Quite a number of visitors frequent this place and flowers and ornamental plants have been largely distributed.

Nursery.—The demand for cacao being slow 1,000 Nutmeg seedlings were grown and these have been in steady demand. A pinery has been established and the plants are doing well. A small nursery for the "Uba" variety of cane has also been started.

8. MONTPELIER EXPERIMENT STATION AND NURSERIES (ST. JAMES.)

Mr. S. Scudamore, who was in charge of this nursery, resigned in March and the work of the nursery was taken over by Mr. N. R. McHardy who was appointed Inspector of Plant Diseases for the western end of the Island.

During the year there has been a large demand for cane cuttings of the Uba variety. The nursery not having sufficient of this variety established could not supply the demand. The varieties of canes for which there has been little or no demand have been abandoned and the areas established in Uba thus enabling the nursery in the coming year to be in a better way to meet the demand for cuttings of this variety and to aid the planters in their war against the Mosaic Disease of Sugar Cane.

There has been little demand for cacao seedlings from this nursery.

The following plants were distributed during the year.

Uba	..	..	..	155,465
White Transparent	..	..	..	10,715
B. 208	..	..	..	25,553
D. 625	..	..	..	12,702
J. 72	..	..	..	2,925
B. 6450	..	..	..	15,430
Ba. 11569	..	..	..	2,400
B.S.F. 12 (27)	..	..	..	4,000
				229,190
Cacao	..	..	..	1,350
				230,540

During the year £43 7s. 10d. was realised from the sales of bananas and canes from the nursery.

RAINFALL.

1923.	Inches.
January	0.00
February	0.00
March	1.52
April	3.16
May	12.00
June	7.15
July	9.35
August	4.95
September	12.95
October	8.70
November	3.80
December	0.00
Total	63.58

9. SUMMARY OF PLANTS DISTRIBUTED BY THE DEPARTMENT DURING THE LAST THREE YEARS.

	1923.	1922.	1921.
Cacao	1,570	15,181	45,432
Citrus	4,009	4,460	4,331
Nutmeg	878	651	5,761
Eucalyptus	333	291	504
Cane Tops and Cuttings	454,306	749,814	198,605
Misc. Fruit and Economic Plants			
including timber trees	16,803	11,133	12,683
Ornamental Plants	29,664	25,279	36,352
	507,563	806,809	303,668

The Garden and Plantation sales for the past three years have been as follows:—

1923	£652 7 0
1922	456 2 8
1921	516 4 8

Contributions to the Gardens have been received from the following:—

Foreign—

U.S. Department of Agriculture.
 Department of Agriculture, Kampala, Uganda.
 Royal Botanic Gardens, Kew, Surrey, England.
 Missouri Botanic Gardens, St. Louis, Mo.
 Singapore Botanic Gardens.
 C. H. Lankester, Cartago, Costa Rica
 F. H. Baker, Richmond, Australia.
 Mrs. C. W. Hughes, Kangaroo Island, South Australia.
 Clarence LeFranc, Nicaragua
 H. R. Angell, Macdonald College, Canada.

Local—

Jamaica Agricultural Society, Kingston.
 W. Cradwick, Mandeville.
 Lt. Col. Marescaux, Cherry Garden, Constant Spring.
 J. Thomas, Home Cottage, Balaclava.
 G. P. Dewar, Duncans.
 Medical Superintendent, Lunatic Asylum.
 Major Nicholson, Up Park Camp.
 Mrs. Crowden, Bridge Pen, Halfway Tree.
 A. Scarff, Public Works Office, Kingston.
 Lieut. J. H. Owen, Kingston.
 H. R. Melville, Glenlyn, Lyndhurst Road, Cross Roads.
 Mrs. Carpenter Smith, Havod, Constant Spring.
 Mrs. V. Lockett, Bedford Avenue, Kingston.
 J. Hirst, May Pen.
 G. A. Rock, General Post Office, Kingston.
 J. Sutton Brown, Kingston.

M. S. GOODMAN,
 Actg. Superintendent Public Gardens.

III.—AGRICULTURAL EXPERIMENTS.

ANNUAL REPORT SUPERINTENDENT OF AGRICULTURE.

Director of Agriculture,
 Kingston.

Sir,

I have the honour to submit my Annual Report for the year ending the 31st of December, 1923.

I have devoted my entire time to the campaign in the control of Mosaic Disease of Cane, with the exception of the first four months of the year, January, February, March and April, when I was engaged as a Commissioner in the control of Foot and Mouth Disease in the western parishes.

Extent of Mosaic Disease in the Island.—After making a careful survey of the Island I found that Mosaic Disease was making rapid strides in the cane areas, particularly so, in Westmoreland and Clarendon, so much so, that in some cases the percentage of infection reached its maximum (100% infection) in fairly large areas of cane and in no case was there to be found a large area of cane where the disease was not present.

Public Meetings.—Public meetings were held in different sections of the Island starting with a general meeting in Kingston convened by the Imperial Association to bring this matter before the country in an endeavour to start a vigorous campaign for the eradication of the disease. Incidentally a resolution was moved by the Chairman nominating the Department of Agriculture free from all blame in the spread of the disease, and placing the blame upon the Planters themselves for having neglected to take advantage of the advice and assistance given them for the control of the disease by the Department of Agriculture. Meetings were also held at May Pen called by the Custos of the Parish, the Hon. George Mulholland, another at Falmouth at the request of the Northside Planters Association, and a further meeting in Westmoreland, inaugurated by Mr. Victor Michelin, Manager of the Frome Belle Island Estates and others, and largely attended by Managers and Book-keepers of the Estates in Westmoreland. These meetings were followed in most cases by a renewal of the campaign against Mosaic Disease, and in many cases by a careful search for the disease on Estates which hitherto were doing nothing to stop the spread of the disease. In several instances Estates and fields which were thought to be free of the disease revealed a considerable infection in a root to root search.

Steps taken for the control of Mosaic Disease.—The following steps for the control of the disease have been taken and are the lines along which we are working.

- (a) The passing of the Mosaic Disease Law.
- (b) The revision of the Department Bulletin.
- (c) The devotion of the entire time of the Supt. of Agriculture to this work.
- (d) The appointment of two Plant Disease Inspectors to assist the Supt. of Agriculture, one located in Westmoreland and the other in Trelawny.
- (e) The holding of public meetings where desirable and necessary to arouse public interest in the matter.
- (f) The starting and re-establishing of Sugar Cane Nurseries in Westmoreland, Clarendon and Hanover, where healthy tops may be obtained for replanting in the diseased areas.
- (g) Establishing small nurseries of Uba Cane on each estate.

Plant Disease Inspectors.—The appointment of these two officers for this work has been of the greatest value for it has enabled a close check to be kept on the progress of the campaign on each property, and has kept managers and others in authority posted accurately with regard to this important feature of their work. In a large measure a considerable amount of educational work has to be done, for in many cases managers and others did not realize fully the danger of this disease and did not trouble to familiarize themselves with the symptoms of the disease. I think in a large measure this was due to the very natural aversion of adopting the only feasible measure of eradication, that of destroying the diseased cane. It requires a considerable amount of vision and determination on the part of a planter to order the ruthless destruction of all diseased cane on his property, and even after this has been done to continue

week after week this vigorous campaign. In many cases these canes have been grown at great expense and considerable trouble, and one must view with sympathy this attitude, though still pursuing the ultimate end with undiminished determination. I am pleased in this connection to bring to your notice the excellent work being done by Messrs. Tucker and Kirkham who are throwing themselves with enthusiasm into the work and discharging their duties with efficiency.

Cane Nurseries.—Cane Nurseries are located at five centres, Montpelier in Hanover, Robin's River and Bulstrode in Westmoreland, Danks and May Pen in Clarendon.

Montpelier Nursery.—This nursery has supplied a large number of Uba Tops and other canes during the year, which has enabled every Estate in the western part of the Island to establish a Uba Cane Nursery of its own, varying in size from five to thirty acres, so that there will be no shortage of Uba Tops in the present year, when it is found necessary to replant heavily infected fields with Uba Cane. The Nursery has been very much improved within the last three months under Mr. McHardy's management. The Mosaic Disease which kept recurring has been completely eradicated. A careful watch however, is maintained and a reward offered for each diseased root found by a labourer or the headman, and a fine inflicted on the headman if a case is found by Mr. McHardy.

Robin's River Nursery.—This location was selected on the advice of Mr. Edward Morris as it would be outside the cane area of Westmoreland, and would ensure a supply of healthy tops in the Fall of 1924, when tops are scarce and Fall plants are being put in. We have to thank the Custos of the Parish, the Hon. Hugh Clarke, who has kindly given fifteen acres of choice land for this nursery, free of cost for the benefit of the Parish. Ten acres have already been planted, the balance will shortly be put in hand. A supply of B.H. 10.12 seedling cane has also been secured and planted.

Bulstrode Nursery.—This may be regarded as the Central Nursery of Westmoreland from which a supply of healthy native cane tops will be distributed in the Fall of 1924. Each estate having already a nursery of Uba it is not necessary to propagate this cane further in this nursery and the planters advised the growing of Transparent and Ribbon Cane as this would be their greatest need. The area of this nursery is ten acres.

Denbigh Nursery, Clarendon.—The Custos of the Parish, the Hon. George Muirhead, kindly gave fifteen acres of fine land for the Parish Cane Nursery at Denbigh. Ten acres of this has already been planted with Uba Cane, and the balance will be completed within a short time. A heavy demand for Uba tops is anticipated in the Fall of 1924.

Danks Nursery.—This nursery was abandoned in 1923 and replanted with Uba in October of the same year. Unfortunately none of these tops has grown, due to the drought. I have arranged for a further supply of tops which will be planted as soon as the rains fall. This nursery will form a valuable adjunct to the Denbigh Nursery.

Uba Cane.—This cane is destined to play an increasingly important part in the Sugar Industry of this Island; the area under cultivation has rapidly increased, a conservative estimate would put this in the neighbourhood of 2,000 acres. This cane possesses the following advantages:—

- (a) Its immunity to Mosaic Disease.
- (b) Its comparatively heavy tonnage on poor land.
- (c) Its drought resisting qualities.
- (d) Its ease and cheapness of cultivation as a plant and more so as a ratoon.
- (e) In St. James where it is extensively grown, one estate having 300 acres under cultivation, the manager assures me that he finds the Uba to be 50% more valuable than the Transparent, acre for acre, and he is certainly satisfied with its results. On another estate in Trelawny where 100 acres are in Uba all established from two original cuttings, where Mosaic Disease had saturated the fields, I am assured that the Uba cane has given from 50% to 75% more sugar, acre for acre, than the Transparent, and 100% more tonnage and has cost considerably less to cultivate. No difficulty has been found up to the present time in handling either the cane or the juice in the factory. Two points are raised by planters against the Uba Cane, one that this cane takes sixteen to seventeen months to ripen, and secondly that the juice is poor. The first point may equally well be raised against any other plant cane in Jamaica as it is well known that the White Transparent Ribbon or any other extensively grown cane in the Island does not come to maturity as a Spring plant, but only as a Fall plant, where it has the full advantages of sixteen to seventeen months growth. With regard to the second point, that of poor juice, it was found on test at Hope that at seventeen months the sugar content of the Uba was equal to that of the White Transparent. I have made arrangements with planters in different parishes to test in each parish this matter of the Uba juice, and so settle definitely this constantly raised point. Taking into consideration the advantages and disadvantages of the Uba it must be readily conceded that we have, as is the experience in Porto Rico, much to be thankful for in the introduction of the Uba Cane.

Progress of Work.—I am pleased at this juncture, which is a comparatively short time after systematic work in the eradication of the disease started, to be able to report that there is every hope that the disease will be checked and ultimately controlled to such an extent that its effect on the cane crop of the Island will be negligible. Granted of course, that the work of the eradication continues and in many directions pushed more and more vigorously.

We find the following conditions obtaining in various sections of the country at the present moment:

Trelawny.—The spread of Mosaic Disease has been checked on all estates where the disease was less than 10% and in the majority of cases the percentage of infection has been reduced to less than 1%. One large factory that started the campaign by paying 1/- per hundred for diseased cane, which were then easily found, is now paying 14/- per hundred and it is with difficulty that a diseased cane is found on this Estate. In another case the disease has been so controlled that the Attorney has offered £3 0s. 0d.

to the labourers roguing if for a month no diseased root is found by the Overseer. The Trelawny planters are to be congratulated on having taken the necessary steps in the majority of cases when the nature of this disease was first brought to their attention in 1920, for the eradication of the disease. As a consequence the disease was kept in check and treatment is now comparatively easy and less expensive than it would otherwise have been.

Here as at other centres, a most vigorous effort will have to be made as soon as crop starts and the ratoon fields begin to grow to clean up these thoroughly. Where the disease is still over ten per cent., arrangements have been made to replant the fields with Uba cane.

Westmoreland.—The work of eradication was centred on the Fall plants of which there was a very large area under cultivation. These have been systematically rogued with the result of a reduction of over fifty per cent. of infection. The total percentage having been reduced from an average of five per cent. to less than two per cent. This statement unfortunately does not refer to every estate, whether the percentage of disease is so high from planting diseased tops that roguing was impracticable and the replanting of these fields is necessary and has been arranged for with Uba Cane. A vigorous campaign will be launched on the ratoons as soon as they begin to sprout. Arrangements have been made to do this. It will mean the closest possible attention by all planters if the results are to be as satisfactory as has been obtained with the Fall plants. Each estate in the parish has established a nursery of Uba Canes aggregating 275 acres in extent, this will give tops to such fields as are heavily infected and where roguing is impracticable.

Clarendon, Vere Section.—Systematic roguing has been continued during the year and a considerable reduction in the percentage of the disease has been the result. The disease is just making its appearance in Vere, and the Vere planters generally are to be congratulated on having taken it in hand so energetically and at such an early stage. Continued watchfulness will be necessary however, if the disease is to be kept from spreading.

Upper and Central Clarendon.—This is one of the most infected areas of the Island, due to the extensive planting of corn in the area which undoubtedly transmits Mosaic Disease. So far efforts to eradicate the disease have been halfhearted and the results unsatisfactory, with the exception of Denbigh Estate, where the Overseer, Mr. Redpath, rogued his fields thoroughly with such good results that it is with difficulty that a diseased root is found in his plant canes. The ratoons will be replanted in the Fall of 1924, 100 acres of Uba has been established on the estate and is giving every satisfaction. The Uba Cane will have to be resorted to in this area (May Pen Section) as it is so saturated with Mosaic Disease that even after careful selection of tops and preparation of the fields, the disease spreads with such rapidity, in spite of roguing, that disease-free cane is almost impossible to grow. The nursery at Denbigh will be a valuable asset as from this a large area of Uba will be planted in this district in the Fall. I would not be surprised to find that the Uba Cane will be a great blessing to this drought and disease-stricken belt, as it will ensure a regular crop under trying conditions. Both Sevens and Denbigh Estates in order to encourage the growing of this cane have arranged to pay the same price for it as they do for any other cane.

St. Catherine.—The disease is under control due to the systematic roguing which has been practised by the large estates in this area. Bernard Lodge is to be congratulated in having under the energetic and efficient direction of Mr. Caryll reduced the infection from 2% to one-tenth of one per cent., both in plants and ratoons. I saw a magnificent field of 300 acres of plants just ready to cut in which a Mosaic-diseased stool was not to be found. In other sections the roguing of ratoons requires closer attention and on one estate it will be necessary to replant about 50 acres of ratoons where the disease is serious.

I have the honour to be,

Sir,

Your obedient servant,

P. W. MURRAY,

Supt. of Agriculture.

REPORT OF PLANT BREEDER.

Sir,

I have the honour to submit my report on the Experiment Station for the year ended December 31st, 1923.

Drought and Water Supply.—The past year was again a very trying one. From July to September the rainfall was only 6.01 inches and during those months our water supply which is always reduced to a minimum during the months of drought, was quite inadequate for our requirements.

Canes.—The demand for tops, particularly of Uba and B.H. 10 (12), has been great this year, a total of 225,116 cuttings having been distributed. The Uba being immune to the Mosaic Disease is in great demand for planting in districts where there is a large percentage of this disease. The B.H. 10 (12) which is a very promising variety with a very high sucrose content is also much in demand. Its cultivation at the Station is being extended to meet the requirements as far as possible for next season's planting.

Several fields of old canes have been replanted. The old stools were dug out, the fields ploughed and cross-ploughed, trenched and replanted with all the most promising varieties.

The area under canes was extended this year owing to the demand for tops. The Mango plot to the north of the Station which contained native Mango trees to be budded and a few inferior Indian varieties was cleared, cultivated, and planted with B.H. 10 (12). The cultivation of this plot has necessitated the building of a concrete irrigation gutter 278 feet long. The approximate area under canes is 21 acres.

The P.O.J. 100, B.S.F. 12 (24), B.S.F. 12 (34), B.S.F. 12 (45), have been discarded owing to the poor results when compared with the White Transparent. The D. 625 has also been discarded on account of its susceptibility to Mosaic Disease. There are several other new varieties which are being given a further trial in comparison with the White Transparent. Those that do not prove worthy of cultivation will be discarded during the next year.

The seedlings which were obtained last year from crosses between the Uba and other varieties will be tested next year. Some of these seedlings are very promising. Owing to the unfavourable weather conditions which prevailed during the year only a few varieties of canes started to flower in December. Unfortunately the Uba has not yet flowered and does not show any sign of flowering so that there is no prospect of obtaining any crosses with the Uba this year. Owing to the continual recurrence of Mosaic Disease at the Montpelier Nursery, where crosses with the Uba were obtained last year, all the old canes were cut and the stools dug out and the plots replanted. It will therefore not be possible to obtain flowers for the purpose of cross-fertilisation from that nursery either. The inflorescences of the varieties that are now in flower will be gathered and sown with the hope that some good seedling varieties will be obtained from them.

The cultivation of the Mexican Striped and Badilla which were received from Dr. Lyon of Honolulu is being extended. These are said to be highly resistant to the Mosaic Disease.

The former is the more promising of the two. Plants of these varieties will be ready for distribution about October, 1924.

Our vote for the distribution of cane tops was reduced this year from £150 to £50 which was quite inadequate for the supply of the big demand for tops and was the cause of the big drop in the number of tops distributed. Owing to the decrease in the vote the orders received for tops could not be supplied in full but had to be reduced so that all orders received could be supplied in a limited way. If the proposed erection of the Central Factory in St. Thomas matures there will be a big demand for tops from the Experiment Station as there are no nurseries in that part of the Island.

Pines.—The pinery has been further extended in area to two acres. The crop of pines this year was not as large as last year but a good price was obtained throughout the season.

During the year the variety 'Black Jamaica' was badly attacked by a species of *Phytophthora* which caused the rotting and death of the innermost leaves of the plants. The Microbiologist advised that this variety be discarded from the cultivation.

Mangoes.—All the mangoes along the Station Border that were fit for budding to the Bombay have been budded and several undesirable varieties in the mango walk have been cut back for budding also to the Bombay.

Grass.—The Wynne Grass (*Melinis minutiflora*) flowered freely during December last. The seeds were collected and a large quantity distributed.

Apparently this grass does better at an elevation of 1,300 feet to 2,000 feet than in the lowlands. Seeds of this grass have been distributed for trial.

Cuttings of the Elephant Grass (*Pennisetum purpureum*) were presented to us by Mr. Spooner and Mr. John Barclay. They have so far shown promise of doing well in this district and we have made them into cuttings and planted a larger plot.

Cacao.—During the year under review the usual pruning was carried out. A supply of stable manure was again given to the young trees which greatly helped in their resisting the severe drought which occurred during the year. A few of these trees were requisitioned for the British Empire Exhibition and the spots had to be replanted with young seedlings. The crop reaped during the year was only fair and the pods were not so large as in the preceding year. This can be attributed to the lack of water as very little was available for irrigating this plot.

Coffee.—The usual pruning was carried out in January at the completion of the previous crop. A few of the trees set out last year were also requisitioned for the British Empire Exhibition and new seedlings were set out in their places. Quite a few of the older trees were taken out having attained a very unsightly appearance and the spaces replanted with young seedlings.

The crop reaped was a very large one but fully one-third of it was rendered 'light' owing to the drought. The plot has been cultivated and despite the severe drought the majority of the trees are in a very flourishing condition.

Banana.—The old banana plot has given place to the Mango Grove. The Banana plot set out in October, 1922, is giving a very good crop. Fully one-half of the crop has been reaped within twelve months of planting. The plot has been kept irrigated throughout the year and this is greatly responsible for the very encouraging results. There has been no sign of the Banana Borer in this plot.

As it might be of interest I include a full report on the seedling bananas mentioned in last year's report. The seeds were sown in 1921 in boxes and four germinated. When they were about four inches high they were set out in pots and in October of the same year when about 8 inches high they were planted out in a bed that had been thoroughly cultivated and mulched.

The plants grew but little from October, 1921, to July, 1922, and during the excessive heat of the month of July it was noticed that their leaves were being scorched by the sun and had practically died down to the little bulb in spite of continual watering. The very small bulbs were taken out of the beds and planted in pots and placed in the shade. They made fair growth and when about eighteen inches high in October of the same year they were again planted out in holes that had been specially prepared for

them 2 feet deep by 2 feet square and filled with thoroughly rotted manure and soil and the surface around each plant mulched with manure. One of the plants was lost during November. During the prolonged drought that was experienced after they were planted out the seedlings had to be watered continually. They are now about 5 feet high from the ground to the top of the heart leaf and are in a very healthy condition.

Cassava.—The experiment carried out showed that the Jamaica White Stick (sweet) is a heavier bearer than the Trinidad No. 15 (sweet), and these two varieties have been again replanted under the same conditions as a second test. Of the three bitter varieties Bobby Hanson, Malta Hotel, and Solier, the Malta Hotel is by far the heavier bearer with Bobby Hanson taking second place.

Citrus.—The older trees were pruned during the year and spraying against the Black Fly with Lime Sulphur Wash was carried out. The trees suffered greatly from the protracted drought. Owing to the very slow growth many of the young trees were not ready for budding but a few of those that were budded have been successful.

Grapes.—The general pruning was carried out in February and spraying with Bordeaux Mixture as a preventative against the "Black Spot" to which grapes are so highly susceptible. No pruning was done in August as it was thought advisable to allow the vines to rest off until next spring.

School Garden.—The usual crops of vegetables were cultivated by the Students and quite a good return was made especially from the tomatoes and garden eggs.

Agricultural Education.—The Students of the Farm School received instruction in all the crops named above for five days each week. They have also done practical work in forking, ploughing, irrigating, budding, grafting, fermenting and curing of cocoa and coffee, and in the preparation and application of fungicides and insecticides.

Mr. L. A. Powell, the Master in charge of the students in Practical Agriculture, has taken great interest in this part of the work and there has been a great improvement with the crops under his charge.

M. S. GOODMAN,
Plant Breeder.

IV.—FIBRE FACTORY AT LITITZ.

The factory was in operation for the first six months of the year. The estimate of the manager that 200 tons of fibre could be produced at the first operation of the Factory proved to be seriously incorrect as only 50 tons of fibre could be produced, due to a shortage of leaves. The young fields were found to be so backward due to the droughts in 1920, 1922 and 1923 that it was not possible to obtain fibre of "No. 1" Quality from them. The machinery gave great trouble due to the Robey Semi-Diesel Oil Engine being out of adjustment.

The Baling Press supplied proved to be too small and caused great delay in baling the fibre. The checking of leaves was most unsatisfactory, the Factory being charged for a great many more leaves than were received. A weigh-bridge has now been installed so that the check will be by weight in future. It is estimated that several tons of clean fibre were lost by pilfering during the crop-period of six months.

The staff has now been reduced to the Assistant Engineer in Charge and only current operations of the maintenance of the plantation are being carried out. Next year the young fields should have grown to reaping standard and the Factory should then be able to work on a commercial scale.

Board of Management.—The Board of Management held 3 regular meetings and in addition met a Select Committee of the Legislative Council at Lititz on 14th June. The death of Mr. A. C. L. Martin on December 29th deprived the Board of a most valuable member who took great interest in the people of Lititz and in the fibre industry.

Crop.—See attached statement showing quantity and value of the fibre sold.

LITITZ CROP SALES, 1923.

Grades.	Bales.	% of Crop	Destina- tion New York.	London.	Net Weight.	Net Tons.	Gross Value of Sales.	Average Price per Ton. (2,240)
					lbs.		£ s. d.	£ s. d.
1. A ..	324	70.74	324	..	82,234	36.7	1,198 14 5	32 14 0
2. B ..	49	10.70	8	41	12,200	5.4	157 7 11	29 0 0
3. C ..	85	18.56	6	79	20,084	8.9	201 14 4	22 13 0
Totals	458	100%	338	120	114,518	51.0	1,557 16 8	30 11 0

1923.	<i>Rainfall:—</i>		Inches.
January	..	..	0.72
February	..	..	1.60
March	..	..	0.08
April	..	..	4.67
May	..	..	5.46
June	..	..	0.20
July	..	..	0.33
August	..	..	4.76
September	..	..	1.82
October	..	..	4.99
November	..	..	4.73
December	..	..	—
Total	..	..	29.36 ins.

LITITZ FIBRE PLANTATION AND FACTORY EXPENDITURE TO 31ST DECEMBER, 1923.

Plantation:—		£	s.	d.	£	s.	d.
Weeding and Cleaning 805½ acres	..	495	1	7			
Planting 214¾ acres	..	304	7	11			
Supervision	..	125	8	0			
Miscellaneous	..	330	8	5			
Total	..				1,255	5	11
Factory:—							
Manufacturing Labour	..	989	12	9			
Supplies	..	723	17	6			
Maintenance and Repairs, etc.,	..	187	5	1			
Total	..				1,900	15	4
General:—							
Salaries	..	370	16	8			
Truck Expenses	..	264	8	4			
Miscellaneous Expenses	..	279	19	7			
Total	..				915	4	7
Capital Expenditure	..				337	14	0
Total Payments	..				4,408	19	10
Total Receipts	..				1,333	14	2
Fibre Sales	..	£1,313	13	6			
Miscellaneous	..	20	0	8			
Debit Balance on 31st December, 1923	..				£3,075	5	8

CAPITAL EXPENDITURE, LITITZ SISAL FACTORY.

Particulars.	Original Estimate.	Actual Expenditure to 31st Dec., 1923.
	£	£
<i>Buildings and Equipment:—</i>		
Factory	2,247	2,829
Workmen's Building P.W.D.	1,733	2,110
do. do. D. Agr.	600	352
Garage & Loco. Shed	..	277
Manager's House	1,500	576
Drying Yard & Fencing	380	666
Furniture	810	246
Water Supply	8,055	5,632
Total	£15,325	£12,688

<i>Machinery & Equipment:</i>				£	£
Factory	..	..	..	6,117	8,013
Locomotive	..	..	..	1,100	623
Waggons	..	..	..	900	794
Rails	..	..	..	3,130	2,417
Total	..	..	..	£11,247	£11,847
<i>Construction Charges—</i>					
Personal Emoluments	..	..	..	..	603
Transportation	..	..	..	268	1,384
Surveys and Miscellaneous	..	..	..	160	478
Total	..	..	..	£428	£2,465
Grand Total	..	..	..	£27,000	£27,000

V. AGRICULTURAL EDUCATION.

REPORT OF HEADMASTER, GOVERNMENT FARM SCHOOL.

Government Farm School, Hope, Kingston P.O.,
26th March, 1924.

Sir,

I have the honour to submit this my Annual Report on the Farm School for the year 1923.

The number of Students attending the School during the year was as follows:—

Easter Term	..	..	30
Midsummer Term	..	..	29
Christmas Term	..	..	29

The following Students completed the School Course and were awarded Certificates:—

Q. O. Lindo, Maggoty	J. B. Estevez, Buff Bay
H. C. Bowen, Adelphi	S. W. Sutherland, Oracabessa

Staff.—During the year Mr. A. F. Thelwell, Assistant Master, was seconded for duty with the "Foot and Mouth Disease" Campaign and Mr. R. O. Bell acted in his place.

Curriculum.—The usual work was carried out. It was impossible to give the students any work in practical Science as we have no Laboratory. The work in practical carpentry has been handicapped by the lack of workshop, tools and equipment. The need of electric light is very strongly emphasized in the night preparation classes. It is impossible for students to do good work in a dimly lighted classroom and the construction of our building prevents the successful use of kerosene lamps.

General.—The discipline and health of the students was good. The need of a suitable recreation room was marked as the students had no where to go except the dormitories or class room when not actually at work. It will be appreciated that this is a serious defect in a school where the students are all over 16 years old. The class of boys we have is highly influenced by environment and I consider that a well fitted reading and recreation room would have been an invaluable asset in the school as has been proved in the army.

The sanitation of the School is still the same as in the old Industrial School days and a modern system is badly needed both from an educational and sanitary point of view.

The Students rendered valuable service in the work of the Stock Farm and the Experiment Station.

I have the honour to be,

Sir,
Your obedient Servant,
ROY S. MARTINEZ,
Headmaster.

REPORT BY MEDICAL OFFICER.

Halfway Tree,
26th March, 1924

Sir,

I have the honour to report that the general health of the students of the Hope Farm School for the year ending December 31st, 1923, has been good.

Several cases of Influenza of a mild type occurred during the year; there was no illness of a serious nature.

All the students have been inoculated against Typhoid and Smallpox.

The sanitary conditions are fair but the present type of latrine—the bucket system—should be altered to W.C.'s and absorption pits.

I am, Sir,
Your obedient Servant,
L. A. CROOKS.

The Director of Agriculture,
Hope Gardens, Kingston P.O.

REPORT BY VETERINARY CONSULTANT.

115 Tower Street, Kingston,
4th January, 1924.

H. H. Cousins, Esq., M.A.,
Director of Agriculture,
Hope, Kingston.

Sir,

I have the honour to submit the Annual Report of my work as Acting Veterinary Consultant for the year ended December 31st, 1923.

I lectured to the Students of the Farm School for one hour three times a week on Veterinary Science including the following subjects:—

Care of Animals in health and disease, Hygiene, Anatomy, Physiology, Pathology, Shoeing, Pharmacy, Therapeutics, Theory and Practice of Medicine and Surgery, and also gave demonstrations on the living animals. Three animals were placed completely under the anesthetic influence of Chloroform—one case for castration, and another to replace a prolapsed uterus in a cow.

The Students were divided into three classes, first, second and third year, and the veterinary subjects taught were graded according to class.

I was only called upon to render professional services of a trivial nature to the animals of the Stock Farm, not worthy of mention.

I was however called upon to investigate outbreaks of disease in different parts of the Island, as follows:—

4th January.—Cordeal Pen on the Old Harbour Road—supposed outbreak of Foot and Mouth Disease in goats. Diagnosis, Mycotic Stomatitis.

5th January.—St. Mary, Robin's Bay—supposed outbreak of Foot and Mouth Disease amongst goats. Diagnosis, Mycotic Stomatitis. This place had been quarantined but was immediately released.

29th January.—St. Andrew, Lyndhurst Road—supposed outbreak of Foot and Mouth Disease in a hog. Diagnosis, injury to foot.

30th January.—Treatment of pimples and dropsy in horse, vide minute on letter No. 759.

2nd February.—Treatment of Gangrene of the skin in cattle.

7th February.—Linstead—supposed infectious outbreak of disease among cattle. Diagnosis, diarrhoea due to feeding young grass after severe drought.

5th February.—Treatment of warts on cattle.

12th February.—Old Harbour, Colbeck Estate, supposed outbreak of Foot and Mouth Disease amongst goats. Diagnosis, Mycotic Stomatitis.

21st February.—Clarendon, Four Paths, Sheekles Pen. Investigation of outbreak of disease amongst calves. Could gain no information as the last three dead calves had been burned, but however, your Department was able to determine cause of deaths by obtaining some of the foecal matter from these calves when considerable arsenic was found, due to defective use of arsenical dip.

22nd February.—Linstead, to investigate supposed outbreak of Foot and Mouth Disease among mules of Public Works Department. Diagnosis, Mycotic Stomatitis.

9th March.—St. Andrew, "Nightingale Grove." Serious outbreak of Swine Fever, (Hog Cholera).

On the first two autopsies made, I stated the disease to be Swine Plague, a third autopsy made however on an animal more advanced in the disease, disclosed the fact that I was dealing with a mixed infection of Swine Plague and Swine Fever (Hog Cholera), the latter predominating. The pen was placed under quarantine from the start of the outbreak. Later on Dr. Lockett was called in consultation, he made two autopsies and confirmed my diagnosis of Swine Fever (Hog Cholera). This property sustained a heavy loss, over 60 large hogs succumbing to the disease in less than 6 weeks, leaving but three natural immunes. From enquiries made, the disease had not yet spread to neighbouring pens.

14th May.—St. Andrew—St. Joseph Sanitarium. Second out-break of Swine Fever, (Hog Cholera.) This Institution lost 7 large hogs within a fortnight from the disease. I saw one large sow which was in an advanced stage of the disease and had to be destroyed. These pigs were kept under most sanitary conditions. The three animals remaining were natural immunes. The St. Joseph Sanitarium was placed under quarantine.

15th May.—By instructions from the Department, I again visited the infected area of Swine Fever for further investigation. I found the Disease had spread to the Long Mountain Road, Northward to Camp Commons, and every place where hogs were kept was infected and in about 6 weeks several hundred hogs had died leaving here and there a few natural immunes.

It was very fortunate that the large expanse of Camp property interposed between the infected area and the North and West. This prevented spread. The sea and the city on the South and South-West prevented spread in these directions, and the Long Mountain with a long stretch of sterile land interposed to the East.

30th July.—Third outbreak Swine Fever (Hog Cholera). By instructions from the Department, I visited Llandewey district of St. Thomas to investigate illness in a hog. On arrival I was shown a hog tethered on hind foot. I did not request a Post Mortem as I desired to see the animal later in the disease when pathologic appearances would be more apparent.

I returned 4 days later to find this hog manifesting all symptoms of Hog Cholera, and Post Mortem appearances confirmed the diagnosis. I then asked how many pigs were still on the property, and was told only one, this animal was killed, the pathological appearances confirmed the opinion. These pigs were purchased from a man on the Morant Bay Road, about 2 months previously, probably coming from Kingston.

30th August.—Fourth outbreak of Swine Fever (Hog Cholera). By instruction from the Department I again visited St. Thomas, this time the Easington district, to investigate an outbreak of disease among hogs.

I immediately made post mortem on the first sick hog found which resulted in conclusive evidence of Hog Cholera. On further investigation, I found 12 infected places and that the death rate had been excessively high. Dr. Lockett was now sent down and he corroborated my diagnosis. A very extensive area was then placed under quarantine.

31st December.—Fifth outbreak of Swine Fever (Hog Cholera). By information received that large numbers of pigs had died along the Molyne's Road, St. Andrew, I immediately visited that district. On my first call I found that at this place alone 60 large hogs had died, leaving only 3 which may be natural immunes. Next door all of 14 head died; on the opposite side of the road 17 hogs were kept, 3 had already died, and I saw several showing symptoms of the disease. The man in charge would not permit me to kill one to make a post mortem. I visited the adjacent districts also along the Spanish Town Road to the Ferry on information that pigs had died there. I found that practically all the pigs had died in these parts, and also on both sides of the Ferry River. On leaving the Ferry there are large banana plantations where no pigs are allowed. All the people when asked about hogs, say, "Hog sick killed them all out."

These last investigations took place on the last day of this report.

I have the honour to be,

Sir,

Your obedient Servant,

E. TAVARES.

IMPORTED ANIMALS, 1923.

From England	1 horse
	16 dogs
From New Orleans, U.S.A.	159 mules (quarantined for 2 months).
From Colon	9 horses (Circus).
	(Retained in Island).
From Nassau	6 pigs, (quarantined for one month).

E. TAVARES.

VI. PLANT DISEASES AND PESTS.

ADVISORY COMMITTEE ON THE BANANA INDUSTRY.

J. Roy Johnson, Esq.

J. H. McPhail, Esq.

S. S. Stedman, Esq.

R. P. Simmonds, Esq.

C. J. Veitch, Esq.

Chairman, H. H. Cousins, Esq., (Director of Agriculture).

Secretary, C. G. Hansford, Esq., (Microbiologist).

REPORT OF GOVERNMENT ENTOMOLOGIST.

Director of Agriculture,
Hope Gardens.

Sir,

I have the honour to submit my Annual Report for the year ending December 31st, 1923.

2. I acted as Director of Agriculture during the month of February. During August I was on local leave. From November 19th to December 29th, I was away from the island, my services having been loaned to the United Fruit Co., to investigate an outbreak of the Banana Fruit-Scarring Beetle, *Colaspis hypochlore*, on bananas on the Company's farms in Columbia. My report on that investigation was submitted to you on my return to the Island.

3. The insects of economic importance dealt with during the period under review are referred to below under their food plants.

Banana.—The year under review having been one of drought, the Banana Borer, *Cosmopolites sordidus*, Germ, continued to be very prevalent. But, in the case of those properties on which my recommendations for the control of this insect were systematically adopted, progress has been made in its control. The cardinal points in the control of this pest are, as has been repeatedly stated, the destruction of the old corms, cultivation, and trapping the adults by means of corms cut into two pieces.

Unfortunately, owing to the movement of infested suckers from St. Catherine this weevil has been introduced into another district of Portland

Laboratory experiments on the control of this weevil were carried out and formed the subject of a Progress Report to you dated May 14th, 1923. The experiments were conducted to determine three points—(a) The effectiveness of poison baits: Corms cut into small blocks were shaken up with Paris Green and arsenite of soda, beetles were then allowed access to the poisoned corms, with the result that from 80% to 90% of the beetles were killed in twenty-four hours. In practice, however, it is questionable

whether the insects would feed on the poisoned corms, an ample supply of food being available. (b) To determine whether or not the adults fly: This point was determined negatively by (i) placing beetles on a heated porcelain plate on which they walked about or turned over on their backs and moved their legs, but made no attempt to fly; and (ii) placing beetles on a flat piece of tin moored so that it floated on the surface of water, and the beetles during three hours made no attempt to fly. (c) Immersion of suckers in water: Suckers attacked by the insect in the larval, pupal and adult stages were immersed for twenty four hours in water, with the result that a certain number of the insects, especially those in the immature stages and those more remote from the centre of the suckers, were killed. With regard to the last experiment, I am, therefore, of the opinion that if it is necessary to plant infested suckers it is worth the labour to immerse them, though the results of my experiments were not as successful as those of another experimenter.

Specimens of the Pineapple Mealy Bug, *Pseudococcus bromeliae*, (Bouché), were submitted from one estate. The insects were taken from the tunnels of the Banana Borer in old corms.

Citrus.—The Black Fly, *Aleurocanthus woglumi*, Ashby, continues to be as prevalent as in preceding years, though only a few requests for information as to control measures were received.

The same remarks are equally true with regard to the Purple Scale, *Lepidosaphes beckii*, (Newm), and the Snow Scale, *Chionaspis minor*, (Comst.). Both of these scale insects are very difficult to control by means of spraying; control by fumigation with hydrocyanic acid gas is the means now adopted in most citrus-growing countries.

Cacao.—No outbreaks of insects were reported as occurring on this crop.

Coconut.—Specimens of the insects submitted on this crop were the scale insects, *Diaspis boisduvalii*, Sign., and *Pseudoparlatoria parlatoroides*, (Comst.), and the Shot-Hole Borer, *Xyleborus perforans*, Woll. The last were attacking stems which were also attacked by bacterial or fungoid diseases.

Tobacco.—No reports were received of any outbreaks of the cut-worms and the larvae of Hawk moths which were so destructive in 1920 and 1921. However I worked out the life-histories of the two most destructive species of cutworms. Briefly, these life-histories are as follows:—

Tobacco or Cotton-Boll Cutworm (Prodenia ornithogalli, Guen.).—The eggs are laid in clusters, covered with hairs from the body of the female, on the undersides of the leaves. The number of eggs in the clusters vary from 80 to 220. The duration of the incubation period is from four to six days. The larvae, which vary greatly in colour and in markings, measure from $1\frac{1}{4}$ to $1\frac{3}{4}$ inches in length. The length of the larval stage is from two to three weeks. The transformation to the pupal stage takes place in the soil. The pupa is shiny dark brown in colour. The duration of the pupal stage is from two to three weeks.

Tropical Cutworm (Xylomiges sunia, Guen.) The eggs are palish green in colour and covered with whitish hairs from the body of the female. They are laid on the underside of the leaves in clusters, the eggs in which vary from 200 to 300 in number. The incubation period is from four to seven days. The larva when full grown measures from $1\frac{1}{4}$ to $1\frac{1}{2}$ inches in length; the colour of the dorsum is dark grey with irregular velvety black spots, and a yellow stripe on the sides. The duration of the larval stage is from two to three weeks. Transformation to the pupal stage takes place in the soil. The pupa is shiny brown in colour. The duration of the pupal stage is from ten to fourteen days.

Sugar Cane.—One serious outbreak of the Sugar Cane Moth Borer, *Diatraea saccharalis*, F., was reported as occurring on one estate amongst ratoons of mixed varieties. Unfortunately, on my visiting the estate I found that the canes had been dug out and destroyed before the outbreak had been reported to me.

Bad outbreaks of the Fall Army Worm, *Laphygma frugiperda*, (S. & A.), and the Sugar Cane Looper Cutworm, *Moica repanda*, (F.), occurred in Westmoreland. Of the only case in which I received information as to the result of the application of stomach poisons, the results were highly satisfactory. In some instances the outbreaks occurred on canes of such a height that it was not practicable to apply the stomach poisons.

I understand that there were also outbreaks of caterpillars on this crop in Trelawny, but as these took place during my absence from the Island, I have no information with regard to them.

The problem of the relationship of insects to Mosaic Disease has been receiving attention, but intermittently so owing to unavoidable interruptions. Experiments were carried out with negative results with the Green Leafhopper, *Kolla herbida*, Walk., the West Indian Cane Fly, *Stenocranus sacchivorus*, Westw., and *Peregrinus maidis*, Ashm., as I consider these species as being the most probable vectors of Mosaic Disease in this Island, since they fulfil the conditions which I regard as essential; namely (i) a sucking insect, (ii) wide distribution and prevalent, (iii) agility, (iv.) feed on the leaves near the growing point of the host plant. With regard to *Peregrinus*, the specimens used in the experiments were collected from corn infected with Mosaic. With regard to *Kolla*, I had the opportunity of visiting an estate on which the insect was present in very great numbers and on which Mosaic disease was also present, but if there was any connection between this leafhopper and the disease it is remarkable in view of the large numbers of the insect that the percentage of infection was so very low—1.5% in the worse fields. It will be observed that the species experimented with did not include any Aphids (Green Flies), a species of which is stated to have been proved to be a vector of Mosaic. The reason for the omission is that no species of Aphids occurs in sufficient numbers in Jamaica on sugar cane to fulfil condition (ii) above. The Corn Aphid, *Aphis maidis*, has been stated to be a vector, but I have never observed this species on sugar cane in this Island; it evidently feeds on sugar cane only when driven to do so by necessity. The Green Leafhopper, *K. herbida*, is popularly known locally as the Green Fly and the application of the same name to this species and to the Aphids leads to confusion.

Experiments to prove definitely whether or not a given insect is or is not a vector of Mosaic Disease necessitates the carrying out of a large series of experiments, since there are so many factors entering into the problem. Some of the points, for instance, that require to be determined are:—

- (a) It may be necessary that the infective agent undergo development in the insect vector before infection is possible, that is, that the vector may be more than a mechanical transmitter, as is the case of the transmission of the beet curly-top disease by the leafhopper, *Eutettix tenella*.

- (b) The length of time for which the insect feeds on the host plant may be a factor in the success or failure of the experiment.
- (c) The length of time after which the insect remains in the infective stage after feeding on an infected host.
- (d) It has been found in the case of spinach blight—a disease similar to Mosaic—that adult Aphids are more infectious than the nymphs and that the incubation period of the disease in the plant is shorter after infection by adults than by nymphs.
- (e) The infective agent may not be equally virulent in all parts of the plant, as is the case of Mosaic disease of tobacco.
- (f) The infective agent may be more virulent when taken from plants in the early stages of the disease.

Corn.—One outbreak of the corn earworm, *Heliothis obsoleta*, F., was reported from St. Thomas.

There was a very wide spread outbreak of the Fall Army Worm and the Sugar Cane Looper Cutworm on this crop, beans and peas during September and October in St. Elizabeth. These caterpillars caused some loss around Burnt Savannah, but the attack increased in severity from Mountainside and attained its maximum from Newell to Pedro Plains, decreasing in the vicinity of Southfield.

Sweet Potato.—Requests were received for information on the control measures for the Scarabee weevil (*Euscepes batatae*, Waterh.), the plant-bug (*Spartocera fusca*, Thb.), and the tortoise beetle (*Chirida signifera*, Hbst.).

Yam.—The insects reported as attacking this crop were the scale insects, *Aspidiotus hartii*, Ckll., and a mealy bug, *Pseudococcus* sp., and the yam weevil, *Palaeopus dioscoreae*, Pierce.

Cassava.—Specimens of the Barnacle scale insect, *Ceroplastes cirripediformis*, Comst., were submitted on this crop.

Tomato.—The Green Stink Bug (*Nezara marginata*, P. deB.), known locally as the "Mary Grudgful," was reported as attacking this plant and its life-history was worked out. Briefly, the life-history is as follows: The eggs are light yellow in colour, oval in shape, and are laid in hexagonal clusters on the undersides of the leaves of tomato, corn, tobacco and okra. The number of eggs in the clusters varies from six to fifty. The incubation period lasts from five to eight days. The nymphs molt five times before reaching the adult stage. The duration of the nymphal stage varies from twenty-four to thirty-six days. The nymphs and adults suck the juices from the young foliage and from the fruit.

Grape.—Specimens of the scale insect, *Aspidiotus wae*, Comst., were received from Manchester thickly encrusted on the younger branches.

Mango.—The scale insect, *Chrysomphalus personatus*, (Comst.), was received on the foliage of this tree.

Roses.—The following insects were reported attacking roses—the Cetoniid beetle, *Gymnetis tristis* F., feeding on the blooms, and the Florida Red Scale (*Chrysomphalus aonidum*, (L), the scale insect *Selenaspidus articulatus*, Morg.), and the Florida Wax Scale (*Ceroplastes ceriferus*, And.), on the stems.

4. *Tours.*—Eight tours covering thirteen days were taken into the country for the purpose of investigating outbreaks of insects, two for the purpose of lecturing on the Banana Borer, and one for the purpose of holding a meeting of the banana growers of St. Mary in order to discuss the adoption of measures to minimize as far as practicable the further dissemination of the Banana Borer.

5. *Publications.*—There was a great demand for entomological publications, both from local and foreign correspondents.

The following publications were issued during the year—

Circular 9—Insect Pests of Tobacco.

Bulletin 2—The Principal Agricultural Pests of Jamaica.

In Press:—

Circular 10—Citrus Cultivation.

Bulletin 3—The "White Flies" (*Aleyrodidae*) of Jamaica.

6. *Insect Collection.*—A large number of insects, including many new species, were added to the Insect Collection during the year. I availed myself of the opportunities to add to the collection during my local leave at Cinchona and during my visit to Columbia.

I have the honour to be,

Sir,

Your obedient Servant,

C. C. GOWDEY,

Government Entomologist.

Office of Microbiologist,
 Hope, Kingston P.O.,
 December 31st, 1923.

REPORT OF GOVERNMENT MICROBIOLOGIST.

The Director of Agriculture,
 Sir,

I have the honour to submit my report on the work done in this laboratory during the past year.

The number of samples received for examination was 242, a considerable increase on previous years, and were collected as follows:—

Officers of the Department	..	..	..	125
Jamaica Agricultural Society	..	..	..	36
Private persons	..	..	..	28
Collected by the Microbiologist	..	..	..	53

Many of the samples sent in by officers of the Department were samples of bananas suspected of being infected with Panama Disease.

PLANT DISEASES.

BANANAS—Panama Disease—The figures of cases treated by the Inspectors of Plant Diseases or under their supervision, during the past year show that the number of actual cases treated represent a 40% increase on the previous year, while the number of diseased plants in these cases has increased by only 6%, showing that the inspection has been more thorough than in previous years. Most of the cases occurred in the parish of Portland, in districts where the disease has already been present for some years. During the year the disease appeared in two districts hitherto free from it—St. Catherine, and the Manchioneal district of East Portland. The large irrigated districts of the plains of St. Catherine still remain free from the disease.

1923.	No. of Diseased plants.	New Cases.	Recurrences.	Total Cases.
January	324	60	127	187
February	406	56	112	168
March	340	51	108	159
April	252	40	90	130
May	401	58	127	185
June	319	39	114	153
July	292	40	122	162
August	258	40	104	144
September	262	33	96	129
October	334	29	95	124
November	289	39	104	143
December	530	43	177	220
Total	4,007	528	1,376	1,904
Total for 1922	3,804	332	1,034	1,366

Although this disease has been present in the island for a number of years, and in spite of the efforts of the staff of the Department of Agriculture, aided by that of the Jamaica Agricultural Society, to bring to the notice of the banana cultivators, and especially the small settlers, a number of elementary precautionary measures to be adopted with a view to the exclusion of the disease as far as possible from their cultivations, it is still evident that many small banana growers do not attempt to observe them. Large numbers of leaflets and posters were distributed throughout the banana growing areas of the island during the year, setting forth these measures. A more detailed account of the disease, together with the legislation and orders dealing with it, has been compiled and is now in the press. This will be distributed as soon as published.

A detailed account of the experimental work carried out at the laboratory and elsewhere was submitted during the year. Other experiments carried out since have confirmed the results obtained from the first series, which can be briefly summarised as follows:—

1. The *Fusarium* causing Panama Disease (*F. cubense*, E.F.Sm.) has been found to be indistinguishable in the laboratory from other *Fusaria* closely allied to it, which have been isolated from sources other than bananas suffering from Panama Disease. In spite of the most careful examination no cultural character was found to be sufficiently constant to serve as a means of distinguishing *F. cubense* from its close allies of the group *Oryzporum*, Wr.

2. Although such has been found to be the case in the laboratory, it has also been found that none of the numerous strains of *Fusarium* isolated from sources other than bananas suffering from Panama Disease, was capable of causing any symptom of this disease when inoculated into healthy banana plants. On the other hand, those strains isolated from vascular bundles of diseased bananas in the early stages of Panama Disease, have reproduced the disease when inoculated into healthy banana plants.

3. This indicated that there exists a difference between the two classes of cultures, one isolated from diseased bananas, and the other isolated from other sources, though no morphological difference can be noticed when they are grown side by side in culture.

4. The most successful method of inoculation has proved to be that used by Brandes (Phytopathology, 1919), by inoculation of the plant through the medium of the soil. This method has the disadvantage that it is very slow to show results, some months elapsing before any sign of the disease is visible externally.

A number of experiments were carried out in the field with a view to determining whether the present methods of treatment could be improved upon. Various methods were tried of destroying the diseased banana plant without disturbing the soil. The only successful results were obtained by using large quantities of Arsenite of Soda, applied to the "bulb" and the soil around it after the upper portions of the plants had been cut down and burnt. Under certain weather conditions this method gave good results, but when repeated some months later in very wet weather it would not work. It was considered that the present method used by the Inspectors of Plant Diseases, namely, digging out the entire "bulb" and burning it, was the most reliable, even though attended by the disadvantage of necessitating considerable disturbance of the soil containing the fungus of the disease.

A large series of further experiments is now in progress at the laboratory, but results have not yet been obtained.

Black Spot Disease. (*Cercospora musarum*, Ashby).—This disease, though quite common in Jamaica is rarely of any serious importance to the banana grower. Under some conditions, however, it appears to become a more serious menace to successful cultivation. In consequence of correspondence from the Jamaica Agricultural Society on the subject of this disease, two visits were paid to the district of James Hill, Clarendon. Here the effects of the disease are much aggravated by adverse soil conditions, which weaken the plant considerably. A detailed examination and analysis of the soils of this district is being made at present, to determine whether by the application of suitable manures the effects of the disease upon the cultivations can be modified to any appreciable extent.

Heart Leaf Rot.—A number of specimens of this trouble were received during the year, and various organisms were isolated from the rotting portions. These included several strains of *Fusarium*, *Verticillium*, and four or five different Bacteria. Inoculations were carried out with the bacteria, by injecting them into the inner tissues of the "trunk" of healthy banana suckers. Up to the present no positive results have been obtained in this way, and the primary cause of the disease still remains undiscovered. The bacteria isolated from the rotting tissues appear to be purely saprophytic in habit.

Bonnygate Disease. (*Sphaerostilbe musarum*, Ashby).—This disease is still present in several districts of the island, where it has been known to occur for a number of years. Owing to pressure of other work little attention has been paid to this disease. Clean cultivation and the prompt treatment of affected plants are the best means of controlling this trouble.

Black Head Disease.—A few samples were sent in showing signs of this disease, caused by *Thielaviopsis paradoxa* (de Sey.) v. Hoeh., but this trouble is not serious from the point of view of the industry, and is usually limited to a single plant. It is comparatively of rare occurrence.

Marasmius Disease (*M. semiustus*).—This disease has been noted in several parts of the island, always appearing to be associated with other adverse conditions affecting the bananas. In some cases, bananas growing in dense grass have succumbed to the disease in a wholesale manner, probably due to the very moist conditions prevailing around the base of such plants growing under these conditions. In other cases the attack of the disease has been aided largely by moist climatic conditions, coupled with cold weather, as was seen during the early part of the year in the John Crow Mountains. Excessive nitrogenous manure applied around the base of the plants is also liable to result in an attack of *Marasmius Disease*.

SUGAR CANE, Mosaic Disease.—During the year a vigorous campaign has been organised against this disease, and a series of lectures on it were given in various centres of the island. A general survey of the large cane growing areas was made by the Microbiologist, accompanied by the Superintendent of Agriculture, and a detailed report on the present conditions of the various estates with regard to the disease was submitted. It has been the experience of the officers of the department that the disease is being spread considerably by the practice of interplanting cane with corn (*Zea mays*), which is a very common system among the smaller cane growers. The corn not only contracts the disease, but also acts as a means of multiplying the numbers of the corn aphid, the insect which has been proved to carry the disease from one plant to another. Wherever these two crops are grown together in mixed cultivation it has been noticed that the cane suffers very badly from Mosaic Disease. In consequence of these observations an order is being issued to prevent this mixed cultivation of corn and cane. Guinea corn (*Sorghum vulgare*) has also been found to be affected by the disease in the field though not to the same extent as corn. Consequently this crop must also be regarded as a source of danger to the canefields. A detailed account of the disease and methods for its eradication has recently been published and distributed to the large sugar estates. The methods recommended for its control are:

- (1) the "roguing" out of all diseased plants from fields where the infection is not over 15%.
- (2) the replanting of fields more heavily attacked with selected tops free from the disease.
- (3) the use of resistant and immune varieties of cane, especially the Uba.

Other Cane Diseases.—The *Leptosphaeria* leafspot has been noticed in many localities during the year, though it has little or no effect on the actual production of cane. In several districts the root disease caused by *Rhizoctonia* sp. has caused some damage, especially in the dryer parts of the island.

COCONUTS.—The Bud Rot disease has now been reduced to small proportions by continued elimination of affected trees, and in the absence of severe storms and hurricanes.

COCOA.—Enquiries were received from Portland for measures to deal with the Black Rot Disease (*Phytophthora Faberi*). In view of the low prices prevailing at the present, it is not practical to spray the trees against the disease, which must be controlled as far as possible by purely cultural methods. Reduction of shade to the minimum necessary to good cultivation and general thinning out of the cultivations was recommended, in order to allow free access of light and air, thus reducing the humidity to the atmosphere between the trees.

CITRUS.—A survey was made, and report submitted, on the general conditions of the citrus industry in Manchester. Further work on the troubles described in the report has been deferred until the coming year.

SISAL.—Outbreaks of the leaf disease caused by *Collectotrichum* were reported from several districts, and advice was given as to methods of dealing with the trouble. Most of the diseases affecting this crop are found to be closely connected with abnormal climatic conditions.

TRUCK CROPS.

Potatoes.—Samples of various common diseases of the potato were received from time to time, including scab (*Actinomyces scabies*), *Phytophthora* blight, and *Fusarium* rots. An order is being framed to regulate the importation of seed potatoes into the island, with a view to excluding the Wart Disease (*Synchytrium endobioticum*.)

Pineapples.—Further attacks of *Phytophthora* were observed on some varieties grown at the Hope Experiment Station, and it was advised to discard the varieties found to be most susceptible. The wilt disease associated with *Fusarium* sp. has not been as common as during 1922.

Tomatoes.—Samples of various tomato diseases were received during the year, and a circular was prepared dealing with the more common diseases of this crop. This is now in the press and will be available for distribution shortly.

Other plant diseases noted during the year were:—

Peronoplasmopara cubensis—Mildew of Cucumbers.

Physopella vitis—Rust of Vine.

Plasmopara viticola—Downy Mildew of Vine.

Uncinula necator—Mildew of Vine.

Colletotrichum sp.—Leaf Spot of Coccoes (*Xanthosoma*.)

Collectotrichum sp.—Leaf Spot of Okra (*Hibiscus*)

Thielaviopsis paradoxa—Stem Disease of Coconut.

Gloeosporium mangiferae—Black Spot of Mango fruit.

Fusarium sp.—Fruit rot of Pawpaw.

Mosaic Disease—Beans.

A collection of Jamaican Fungi has been continued during the year, and a considerable number were identified. Special attention has been given to the genus *Fusarium* in connection with the work on Panama Disease, and a large collection of these fungi has been kept in culture and classified. The different strains have been carefully studied, and it is hoped to publish the results during the coming year.

I have the honour to be,

Sir,

Your obedient Servant,

C. G. HANSFORD, B.A.,

Microbiologist.

VII.—LIVE STOCK.

GOVERNMENT STUD FARM, "GROVE PLACE," MANCHESTER.

Board of Management.

This Board was appointed by His Excellency in July as follows:—

James Daly, Esq., J.P.

Clarence Lopez, Esq.

E. W. Muirhead, Esq.

The Director of Agriculture, (Chairman.)

The first meeting of the Board was deferred until the return from England of Mr. C. Lopez and was held in November.

The Livestock was valued at the end of December by Mr. E. W. Muirhead at a total of £4,434 10/ for the "Grove Place" herd, £1,540 for the Beef Stud Animals and £1,360 for the cattle from India not at present allocated as to cost or a total of £7,334.

The original investment in cattle at "Grove Place" was made in the Autumn of 1920 when cattle prices in Jamaica were at their highest.

Heifers that were difficult to obtain at £20 in 1920 are now valued at £8 each.

The original investment of £5,365 would thus show a shrinkage of £3,219 at present values.

The actual valuation to December 31st, 1923, shows a total of £4,434 10/ or a loss of value equal to £930 10/ on the original investment.

It is thus evident that over £2,000 of loss in value on the original investment in livestock has been made good by the breeding of dairy heifers at "Grove Place" of which 136 are by selected dairy Sires.

Owing to the quarantine against the Western parishes and the acute depression in the cattle industry due to drought and low prices the Stud Farm did not receive a normal amount of custom from the public, only 111 visiting cows being served by the Stud Bulls as against an estimate of 200 cows.

The "Working Account" shows a small gain for the year on operating expenses. The unfortunate result of the year 1921-1922, when £800 was lost on the operating expenses of the year, will, it is estimated, have been reduced to a deficit of £200 at the end of March, 1924 as a result of more careful methods of management and the guidance of a competent Board of Management, which has been of great assistance to the Department in effecting an economical administration of the Farm.

The following is the Summary of the valuation of the Live Stock at Grove Place:—

				£	s.	d.
Cattle	..	..	..	3,515	10	0
Horsekind	..	..	..	919	0	0
Total Pen Stock	..	..	..	4,434	10	0
Beef Cattle	..	..	..	1,540	0	0
Indian Cattle	..	..	..	1,110	0	0
Grand Total.	..	..	..	7,084	10	0

LIVE STOCK GROVE PLACE PEN, 1923.

	4	Zebu Jersey Bull "Hon. Mr. Polo"
	1	Ayrshire Bull
	1	Aberdeen Angus Bull
	2	Devon Bulls
8	3	Bull calves of 1923
	9	Native Breeding Cows purchased from Hope
	20	" Holstein Cows from Carton, St. Ann
	14	" Red Poll Cows from Carton, St. Ann
	32	" Breeding Cows from Copse, Hanover
	19	" " " Grier Field, St. Ann
	11	" " " Mt. Plenty, St. Ann
171	66	" " " Dr. Halliday
	7	Pedigree Heifers
	1	Zebu-Jersey Heifer
	25	Native Heifers
	14	Grade Holstein Heifers
	13	" Ayrshire Heifers
	11	" Guernsey "
	15	" Jersey "
	4	" Montgomery Heifers
	22	" Red Poll "
	15	" Swiss "
	34	" Zebu-Jersey "
162	1	" Hissar Heifer
10	10	Plough Steers
351		
		<i>Horsekind—</i>
	1	Imported Thoroughbred Stallion "Water Jacket"
	1	Imported Proof Ass "Kentucky Boy"
	13	Brood mares
	4	Fillies
	2	Colts
	2	Geldings
	13	Mules
	3	Donkeys

39 Head

GROVE PLACE CAPITAL ACCOUNT.
Expenditure to 31st December, 1923.

Heads.		Estimate.	Expenditure.	Balance.
		£	£	£
Purchase of Property	..	10,106	10,106	..
Live Stock	..	6,166	5,365	801*
Dead Stock	..	914	909	5*
Railway Charges	..	52	80	28†
Capital Improvements (Farm and Dairy Bldgs.)	..	6,601	6,151	450*
Miscellaneous	..	161	137	24*
Repairs to Manager's House	..	500	27	473*
Restoration grass pieces	..	500	..	500*
Total	..	25,000	22,775	2,225
Balance available	..	..	2,225	..
		25,000	25,000	..

*Means underspent.

†Means overspent.

GROVE PLACE WORKING ACCOUNT.

April 1st to 31st December, 1923.

Revenue—

	£	s.	d.	£	s.	d.
Rearing Calves	331	1	0			
Sale of Stock	246	15	0			
Stud and Pasturage	116	6	9			
Sleepers and Fence Posts	329	10	6			
Rent	25	8	4			
Produce	106	1	5			
Dipping	16	12	5			
Miscellaneous	4	7	5			
Total				1,171	2	10

Expenditure—

Wages	311	13	0			
Repairs, Tools and Equipment	47	14	5			
Upkeep of Property	94	5	8			
Crops	51	2	5			
Food and Drugs	139	14	4			
Transport of Stock	25	17	7			
Sleepers and Fence Posts	208	5	1			
Stud Expenses	13	15	1			
Rearing Calves	56	15	0			
Planting and Clearing	11	15	9			
Miscellaneous	64	5	5	1,025	3	9
Excess Revenue for 9 months				145	19	1
Debit Balance on 1.4.23				519	3	4
Debit Balance on 31st Dec., 1923				373	4	3

SERVICES BY BULLS AT GROVE PLACE, 1923.

Bulls.	Visiting Cows.	Farm Cows.	Total.
Hereford "Peacemaker"	3	1	4
Sussex "The Arab"	7		7
Devon "Rentpayer"	23		23
Aberdeen-Angus "Popinjay"	5	1	6
Brown Swiss "Trumpeter"	16	17	33
Jersey "Hector"	15	12	27
Guernsey "Coley's May King"	1		1
Jersey "Hon. Mr. Polo"	6	2	8
Montgomery "Dairyman"	10	6	16
Ayrshire "Cyril"		17	17
Holstein "Homestead"	17		17
Grade Guernsey "Eliza 1st's Plato"	1	10	11
Ayrshire "Food Controller"	1		1
Hissar "Pride of the Punjab"		1	1
Total	105	67	172

The rainfall at Grove Place for 1923 was as follows:—

January	1.24
February	2.22
March	.77
April	4.97
May	12.10
June	
July	4.05
August	4.29
September	3.48
October	10.60
November	5.85
December	.17
Total	49.74

GOVERNMENT STOCK FARM, HOPE.

The year 1923 was a very unfavourable one for dairying on the Liguanea Plain. So much had been learnt, however, as a result of 12 years' experience at Hope that the Farm was able to cope with the drought by resort to the Silos and the shredding of "Uba" cane for fodder so as to produce the highest daily average of milk yet recorded in any year, viz: 314 Imperial Quarts per diem.

About £900 had to be spent in permanent improvements in the engine-room equipment, rolling stock and the clearing and planting of lands.

It is estimated that the "Working Account" will be closed at the end of March, in a state of balance.

The Livestock was valued by an outside valuator in the person of Mr. E. W. Muirhead who took great care in assigning values to each animal after a personal inspection and consideration of its record and pedigree, with the following result:—

Valuation 1923	..	..	£8,793
do 1922	..	..	9,446
Reduction in Value	..	..	653

This reduction is due to the fall in the value of cattle as the numbers were slightly greater in 1923 and the quality of the herd had improved from the drafting of 50 cows and heifers below our standard during the year.

In December, despite the unfavourable seasons, we were able to fill all the four Silos with Guinea corn in the ear. A store of 550 tons of excellent Silage was thus obtained.

The Super-Diesel Engine worked splendidly and the "Papec" silage cutter never gave a moment's trouble.

The new steel-wheeled Cuban Cane carts proved of great service in transporting the 550 tons of fodder to the Silos.

The yield per acre averaged about 8 tons. A good deal of seed was also harvested from the surplus Guinea Corn.

Experiment with separated milk powder showed this to be a valuable material for feeding calves, one pound of powder making 4 quarts of excellent separated milk when dissolved in warm water. The calves thrived well on this mixture and the Farm has raised some of the best dairy calves ever seen at Hope. The cost was twopence per quart of separated milk. Another feature of 1923 was the institution of a system of feeding the yearling heifers with silage, or Shredded cane in a building equipped with 30 stanchions. It is now evident that our failure to rear good dairy stock in the past was in some cases due to the neglect of the needs of the yearling heifers which require care and feed if they are to grow out into large, productive cows. The heifer "Cognac 1st" broke the record for the Farm by yielding 6,923 lbs. of milk in the year. The butter fat averaged 5.0 per cent. This is a remarkable illustration of "grading up" by the use of selected dairy Sires of composite breeding. The original cow was a common native scrub cow "Brandy" that only gave 3 quarts of milk. When put to the Zebu-Jersey bull "Experiment" the daughter "Cognac" was produced which gave 10.6 Imperial Quarts. When line-bred to a second Zebu-Jersey bull "Tipperary," the result was "Cognac 1st" with a record of 16.5 Imperial Quarts per diem and of nearly 7,000 lbs. of milk in a year as a heifer with her first calf.

A grade Holstein heifer has since started an even higher standard of production, having given 19.4 Imperial Quarts with her first calf and a prospect of making a remarkable yearly record.

Of the young stock at Hope mention may be made of the handsome Red Poll heifers sired by "Panama," of the promising daughters of the Swiss Bull "Trumpeter," the fine dairy heifers by the English prize Guernsey Bull "Elfordleigh Prince," the splendid Jersey heifers by "Pogis 99th of Hood Farm the 40th" and the new breed of Montgomery (Sanhiwal) cattle from India which is being crossed on our best dairy cows so as to evolve a composite breed of tropical dairy cattle.

The herd has remained free from Tuberculosis since 1912 and no reactors to the annual test have since been recorded. All abortions are strictly treated as though they were contagious and abortions from all causes have now fallen to 2.4 per cent. of the total calvings (3 abortions, 125 calvings in 1923.) Delivery of milk is now made by a light mule-waggon at a cost of less than $\frac{1}{2}$ d. per quart as against 2d. per quart for Motor Transport when we were using this form of delivery in 1921.

For a short haul Guinea-grass power is, in Jamaica, decidedly cheaper than gasoline.

The imported feed used by the Farm during the year was as follows:—

Bran 25 tons at £8 6s. 0d. per ton of 2,000 lbs.

Linseed Oil Meal 11 tons at £13 9s. per ton of 2,000 lbs.

Cotton Seed Meal 25 tons at £12 6s. per ton of 2,000 lbs.

Powdered Skimmed Milk $1\frac{1}{2}$ tons at £70 14s. 6d. per ton of 2,000 lbs.

Schumacher Feed 1 ton at £11 5s. 8d. per ton of 2,000 lbs.

LIVE STOCK "HOPE STOCK FARM" 1923.

	1	Imported Red Poll Bull			82	Native Dairy Cows
	6	Native Red Poll Bulls			13	Native Cows
	5	Imported Red Poll Cows			2	Native heifers
47	35	Native Red Poll Cows and heifers			3	Grade Ayrshire heifers
	2	Imported Jersey Bulls			14	Grade Guernsey heifers
	3	Native Jersey Bulls			15	Grade Holstein heifers
	6	Imported Jersey Cows			20	Grade Jersey heifers
34	23	Native Jersey Cows and heifers			24	Grade Montgomery heifers
	2	Native Guernsey Bulls			5	Grade Nellore heifers
	2	Imported Guernsey Cows			4	Grade Red Poll heifers
6	2	Native Guernsey Cows			10	Grade Swiss heifers
	1	Imported Ayrshire Bull			3	Grade Zebu Jersey heifers
	2	Native Ayrshire Bulls			1	Grade Zebu Holstein heifer
	2	Imported Ayrshire Cows	196			
7	2	Native Ayrshire heifers				
	1	Native Brown Swiss Bull			14	Plough Steers
9	8	Native Brown Swiss Cows			4	Young Steers
1	1	Imported Holstein Bull				
22	22	Zebu-Jersey Cows and heifers	Total Cattle	367		
2	2	Nellore Bulls				
	3	Beef Bulls				
7	4	Beef Calves				
						Horsekind—
					10	Mules
						Poultry—
135	6	Grade Guernsey Bulls			2	Pens Indian Games and Rhode Island Red
	11	Grade Montgomery Bulls				Bees—
18	1	Grade Nellore Bull			15	Hives

WEEKLY ANALYSIS OF MILK SUPPLIED TO THE PUBLIC HOSPITAL AND LUNATIC ASYLUM BY THE STOCK FARM, 1923.

Quarter ending.			Solids.	Fat.	Sp. Gravity.	Solids not Fat.
March 31, 1923	..	..	12.78	4.47	1.0291	8.31
June 30, 1923	etc.	..	12.47	4.25	1.0289	8.22
September 30, 1923		..	12.69	4.40	1.0291	8.29
December 31, 1923	..	..	12.71	4.37	1.0292	8.34
Av. for the year.	etc.	etc.	12.66	4.37	1.0291	8.29

The following is the summary of the valuation of the Live Stock at the Farm in December, 1923.

Cattle	..	..	..	£ 8,548
Horsekind	..	..	..	162
Poultry	..	..	..	34
Bees	..	..	..	23
				8,767

RECORD OF DAIRY HERD MILK YIELD, 1923.

Month.			Av. No. of Cows.	Total Qts. per mensem.	Av. per Cow Qts.
January	..	..	77	10,799.5	4.5
February	..	..	82	9,720.7	4.2
March	..	..	80	9,535.6	3.8
April	..	..	70	8,547.9	4.1
May	..	..	71	9,880.0	4.5
June	..	..	74	11,078.4	5.0
July	..	..	70	10,063.3	4.6
August	..	..	67	9,392.9	4.5
September	..	..	70	9,617.3	4.6
October	..	..	69	8,379.5	3.9
November	..	..	68	8,603.9	4.2
December	..	..	68	8,944.6	4.2
			72	114,563.6	4.3

MILK YIELD, DAIRY HERD 1919, 1920, 1921, 1922, 1923.

Imperial Quarts per diem.

Month.		1919.	1920.	1921.	1922.	1923.
January	.. ..	280.8	279.8	199.1	283.5	348.4
February	.. ..	305.1	299.8	291.2	264.5	347.2
March	.. ..	268.7	245.1	338.8	294.9	307.6
April	.. ..	276.7	239.6	338.5	259.6	248.9
May	.. ..	383.6	194.5	309.3	300.1	318.7
June	.. ..	394.4	190.2	304.0	289.8	369.3
July	.. ..	308.8	194.7	299.0	304.3	324.6
August	.. ..	286.2	186.5	288.7	310.5	303.0
September	.. ..	312.7	207.1	332.8	314.4	320.6
October	.. ..	316.7	250.7	287.8	270.8	270.3
November	.. ..	255.0	286.8	263.5	296.3	286.8
December	.. ..	241.5	230.6	269.4	298.0	288.5
Average	.. ..	302.5	233.8	293.5	290.5	314.2

MILK YIELD, 1923, HOPE DAIRY HERD.

Order.	Cow.	Breed.	Age in years.	Av. C. milk Fat.	Lbs. of Milk.	Milking weight lbs.	Max. milk yield Imp. qts.	Sale value at 8d. per qrt.
1	Cognac 1st	Zebu Jersey	6	5.0	6,022	1,226	16.5	£77 9 3
2	Shrew 1st	Grade Guernsey	9	4.0	5,366	1,182	14.2	69 0 4
3	Fifi	Grade Jersey	8	4.1	5,262	830	9.7	67 13 8
4	Lydite	Grade Holstein	12	4.3	5,170	940	8.8	66 10 6
5	Monica	Grade Guernsey	13	3.8	4,995	990	7.9	64 5 6
6	Carmen	do	9	4.2	4,902	926	15.2	63 1 4
7	Rosette	do	10	4.0	4,658	876	9.6	59 13 5
8	Pansy	Imp. Jersey	13	4.8	4,612	870	11.5	59 7 6
9	Larva	Zebu-Jersey	8	4.1	4,523	950	10.2	58 3 9
10	Norbrook	Native	9	4.2	4,466	1,116	12.7	56 19 0
11	Quail 2nd	Zebu-Jersey	6	4.0	4,358	784	8.5	55 17 5
12	Hector's Pansy	Jersey	5	4.3	4,290	780	10.0	55 0 0
13	Pussy	Grade Red Poll	9	3.9	4,283	936	11.7	54 18 3
14	Honeybelle	Imp. Jersey	14	4.7	4,282	866	9.6	54 17 11
15	Bunny	Grade Holstein	7	4.0	4,233	1,030	11.9	54 9 1
16	Pobess	Grade Red Poll	9	4.0	4,190	929	9.4	53 19 4
17	Diva 4th	Grade Zebu-Jersey	6	4.8	4,145	900	9.4	53 6 8
18	Flighty	Red Poll	6	3.2	4,131	836	13.7	52 19 3
19	Melinite	Grade Zebu-Jersey	6	4.2	4,123	990	11.1	52 17 2
20	Diva	Grade Guernsey	12	4.1	4,110	730	6.7	52 13 10
21	Diva 1st	Grade Guernsey	9	4.3	4,055	794	10.4	52 2 9
22	Perfection	Imp. Jersey	9	4.6	4,030	930	15.6	51 16 10
23	Pet 1st	Grade Zebu Jersey	4	4.2	4,012	734	7.7	51 12 6
24	Sola 5th	do do	4	4.3	4,002	988	11.3	51 9 7
25	Violet 2nd	do do	7	4.1	3,991	960	12.5	51 6 9
26	Ellenstine 2nd	Zebu-Jersey	6	4.0	3,925	750	12.0	50 6 5
27	Fanny 2nd	do do	5	4.9	3,845	840	9.9	49 10 7
28	H. Brisk 1st	Red Poll	4	3.5	3,752	860	8.7	48 8 2
29	Dodo 1st	Grade Holstein	4	4.2	3,727	856	9.4	47 19 1
30	Monica 1st	Grade Zebu-Jersey	8	3.5	3,717	828	9.8	47 16 7
31	Etta of Hope	Jersey	3	5.1	3,636	662	12.1	46 15 3
32	Diva 2nd	Grade Zebu-Jersey	8	4.6	3,566	930	12.6	45 17 3
33	Tilda	Grade Red Poll	11	3.8	3,542	1,340	9.0	45 11 4
34	Badge II	Zebu-Jersey	5	4.3	3,422	672	6.9	44 0 5
35	Blossom 1st	Grade Zebu-Jersey	6	3.8	3,390	742	10.7	43 12 2
36	Rosette 2nd	Grade Guernsey	5	4.6	3,361	786	6.8	43 1 9
37	Janetstine	Imp. Jersey	14	4.7	3,353	902	9.9	42 19 9
38	Dolly	Zebu-Jersey	9	4.2	3,337	912	11.4	42 15 8
39	Monica 2nd	Grade Zebu-Jersey	7	3.8	3,322	950	7.6	42 14 5
40	Lizzie	Grade Jersey	12	4.9	3,288	1,074	10.6	42 6 1
41	Shrew 2nd	Zebu-Jersey	8	5.0	3,154	1,196	8.9	40 11 5
42	Badge	do do	10	5.7	3,116	958	12.5	39 18 11
43	Baby 1st	Grade Jersey	5	4.8	3,113	764	8.8	39 18 2
44	H. Mead 1st	Jersey	5	4.8	2,963	730	8.1	37 19 9
45	Foxy 1st	Zebu-Jersey	6	3.2	2,948	854	6.4	37 15 11
46	Desiree	Red Poll	7	3.5	2,929	960	10.1	37 10 0
47	Beta	Do	12	3.9	2,912	978	7.5	37 8 5
48	Beta 2nd	Do	6	3.5	2,851	812	9.0	36 13 5
49	H's Ethelstine	Jersey	5	4.5	2,843	800	8.2	36 9 0
50	Beta 1st	Red Poll	7	4.9	2,747	900	8.6	35 6 9
51	Monica 3rd	Grade Zebu Jersey	6	5.0	2,663	774	9.4	34 5 3
52	Freda	Grade Holstein	7	3.3	2,632	1,002	7.6	33 17 4
53	Cora	Guernsey	3	4.2	2,605	830	5.5	33 10 5
54	Casilda II	Zebu Jersey	5	3.9	2,581	910	8.7	33 4 1
55	Beetroot	Red Poll, Holstein	5	3.4	2,579	800	11.0	33 3 4
56	Bee	Red Poll	6	3.8	2,575	970	8.5	33 0 3
57	Hector's Gem	Jersey	4	5.0	2,517	746	5.4	32 5 5
58	Ethel	Imported Jersey	13	4.0	2,471	844	7.6	31 15 7
59	Lydite 11th	Grade Zebu-Jersey	6	3.9	2,425	800	14.2	31 4 0
60	H. Pansy 1st	Jersey	3	4.5	2,387	779	9.8	30 14 1
61	Badge 1st	Zebu-Jersey	8	4.6	2,380	946	8.6	30 12 6
62	Shrew 11th	Grade Guernsey	5	3.6	2,326	702	8.6	29 18 5
63	Nana	Grade Holstein	5	3.9	2,317	850	7.8	29 16 3
64	Para	do do	5	3.8	2,278	1,094	18.0	29 6 0
65	Angel 1st	Grade Holstein	4	3.5	2,242	1,060	7.4	28 16 8
66	H. Pansy	Jersey	7	4.5	2,153	774	12.9	27 13 10
67	Pride's Monica	Grade Guernsey	9	4.1	2,146	746	8.6	27 12 2
68	Brown Blossom	Imp. Ayrshire	8	3.8	2,060	920	11.0	26 10 0

STOCK FARM WORKING ACCOUNT.

April 1st to 31st December, 1923.

			£	s.	d.	£	s.	d.
<i>Revenue—</i>								
Milk	..	..	2,279	1	10			
Rent	..	..	42	10	3			
Stock Sales	..	..	446	7	0			
Poultry Sales	..	..	37	18	4			
Rearing Calves	..	..	56	15	0			
Miscellaneous	..	..	147	11	6			
Total	..	..				3,010	3	11
<i>Expenditure—</i>								
Wages	..	..	737	3	2			
Foreman	..	..	113	15	0			
Feed for Stock	..	..	1,429	14	2			
Rearing Calves	..	..	331	1	0			
Machinery and Implements	..	..	544	10	4			
Clearing and fencing	..	..	480	8	11			
Purchase of Stock	..	..	9	0	0			
Miscellaneous	..	..	219	4	4	3,864	16	11
Excess Expenditure for 9 months	..	..				854	13	0
Credit Balance 31.3.23	..	..				304	1	0
Cash Balance 31.12.23 (Debit)	..	..				550	12	0

VIII.—ANNUAL REPORT OF DEPUTY ISLAND CHEMIST.

Government Laboratory,
10th January, 1924.

Sir,

I have the honour to submit the following report on the work done at the Government Laboratory during the year ending 31st December, 1923.

The total number of samples dealt with was 1,809 as compared with 1,233 and 1,497 in the two previous years, and again establishes a record over any previous year.

The samples may be classified as under:—

"A" OFFICIAL.

(1.) *Police—*

Human viscera and organs	..	..	..	16
Substances examined for poison	..	..	..	27
Medicines and Drugs	..	..	..	17
Rums	..	..	..	16
Spirituuous compounds	..	..	..	12
Ganga	..	..	..	15
Counterfeit coins	..	..	..	90
Counterfeiting exhibits	..	..	..	36
Opium exhibits	..	..	..	34
Miscellaneous	..	..	..	3

Under the Drugs and Poisons Law:—

Chemicals and Drugs	..	..	..	3
---------------------	----	----	----	---

Under the Petroleum Laws:—

Gasolines	..	..	..	2
Kerosene Oils	..	..	..	2

Under the Adulteration of Food and Drugs Law, 25 of 1908.

	Genuine.	Adulterated.	Rejected.	Total.
Fresh Milks	23	8	2	33
Butters	2	..	..	2
Lards	1	..	..	1
Lard Compounds	1	..	..	1
Cotton Seed Oils	2	..	..	2
Total Police				312

(2.) *Customs—*

Native Wines	..	..	..	81
Rectified Spirits	..	..	..	14
Motor Alcohols	..	..	..	11
Fuel Oils	..	..	..	18
Disinfectants and Insecticides	..	..	..	6
Flavouring Extracts	..	..	..	6
Condensed and Dried Milks	..	..	..	8
Gasolines	..	..	..	7
Kerosene Oils	..	..	..	2
Rums	..	..	..	2
Miscellaneous	..	..	..	9

Under Government Sugar Test—

Sugars	..	..	..	29
--------	----	----	----	----

Total Customs	..	..	193
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(3.) *Public Works Department—*

Gasolines	..	..	..	1
Waters	..	..	..	1
Solders	..	..	..	2
				4

(4.) *Department of Science and Agriculture—*

Dried Milks	..	..	..	2
Fuel Oils and Gasolines	..	..	..	3
Lignites	..	..	..	5
Disinfectants and Insecticides	..	..	..	4
				14

(5.) *Government Geologist—*

Waters	..	..	..	13
Soils, Minerals, Ores	..	..	..	10
Gas Samples	..	..	..	1
Oil seepages	..	..	..	2
				26

(6.) *Island Medical Department—*

Waters	..	..	..	9
Condensed Milks	..	..	..	1
Chemicals and Drugs	..	..	..	1
Butters	..	..	..	1
				12

(7.) *Medical Officer of Health, Kingston—*

	Adulterated.	Genuine.	Total.
Fresh Milks	8	10	18

(8.) *Jamaica Government Railway—*

Steam Coals	..	..	..	1
Creosoted Sleepers	..	..	..	1
				2

(9.) *Special Investigation Mineral Waters Bath and Milk River—*

Waters	610	610	610	610	8
Total Official Samples	610	610	610	610	589

"B" AGRICULTURAL.

Soils and Sub-soils	..	0 0	0 0	0 0	54
Canes and Cane Juices	..	0 0	0 0	0 0	46
Molasses	..	0 0	0 0	0 0	9
Orange Oils	..	0 0	0 0	0 0	7
Agricultural Limes	..	0 0	0 0	0 0	10
Artificial Manures	..	0 0	0 0	0 0	4
Fertilisers and Guanos	..	0 0	0 0	0 0	15
Cassavas	..	0 0	0 0	0 0	3
Bagasses	..	0 0	0 0	0 0	2
Total	..	0 0	0 0	0 0	150

STOCK FARM WORKING ACCOUNT.

April 1st to 31st December, 1923.

			£	s.	d.	£	s.	d.
<i>Revenue—</i>								
Milk	..	..	2,279	1	10			
Rent	..	..	42	10	3			
Stock Sales	..	..	446	7	0			
Poultry Sales	..	..	37	18	4			
Rearing Calves	..	..	56	15	0			
Miscellaneous	..	..	147	11	6			
Total	..	..				3,010	3	11
<i>Expenditure—</i>								
Wages	..	..	737	3	2			
Foreman	..	..	113	15	0			
Feed for Stock	..	..	1,429	14	2			
Rearing Calves	..	..	331	1	0			
Machinery and Implements	..	..	544	10	4			
Clearing and fencing	..	..	480	8	11			
Purchase of Stock	..	..	9	0	0			
Miscellaneous	..	..	219	4	4	3,864	16	11
Excess Expenditure for 9 months			..			854	13	0
Credit Balance 31.3.23	..		..			304	1	0
Cash Balance 31.12.23 (Debit)	..		..			550	12	0

VIII.—ANNUAL REPORT OF DEPUTY ISLAND CHEMIST.

Government Laboratory,
10th January, 1924.

Sir,

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The total number of samples dealt with was 1,809 as compared with 1,233 and 1,497 in the two previous years, and again establishes a record over any previous year.

The samples may be classified as under:—

"A" OFFICIAL.

(1.) *Police—*

Human viscera and organs	..	..	..	16
Substances examined for poison	..	..	..	27
Medicines and Drugs	..	..	..	17
Rums	..	..	..	16
Spirituuous compounds	..	..	..	12
Ganga	..	..	..	15
Counterfeit coins	..	..	..	90
Counterfeiting exhibits	..	..	..	36
Opium exhibits	..	..	..	34
Miscellaneous	..	..	..	3

Under the Drugs and Poisons Law:—

Chemicals and Drugs	..	..	..	3
---------------------	----	----	----	---

Under the Petroleum Laws:—

Gasolines	..	..	..	2
Kerosene Oils	..	..	..	2

Under the Adulteration of Food and Drugs Law, 25 of 1908.

		Genuine.	Adulterated.	Rejected.	Total.
Fresh Milks	..	23	8	2	33
Butters	..	2	..	..	2
Lards	..	1	..	..	1
Lard Compounds	..	1	..	..	1
Cotton Seed Oils	..	2	..	..	2
Total Police					312

(2.) *Customs—*

Native Wines	..	..	..	81
Rectified Spirits	..	..	..	14
Motor Alcohols	..	..	..	11
Fuel Oils	..	..	..	18
Disinfectants and Insecticides	..	..	..	6
Flavouring Extracts	..	..	..	6
Condensed and Dried Milks	..	..	..	8
Gasolines	..	..	..	7
Kerosene Oils	..	..	..	2
Rums	..	..	..	2
Miscellaneous	..	..	..	9

Under Government Sugar Test—

Sugars	..	..	..	29
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Total Customs 193

(3.) *Public Works Department—*

Gasolines	..	..	..	1
Waters	..	..	..	1
Solders	..	..	..	2

4

(4.) *Department of Science and Agriculture—*

Dried Milks	..	..	..	2
Fuel Oils and Gasolines	..	..	..	3
Lignites	..	..	..	5
Disinfectants and Insecticides	..	..	..	4

14

(5.) *Government Geologist—*

Waters	..	..	..	13
Soils, Minerals, Ores	..	..	..	10
Gas Samples	..	..	..	1
Oil seepages	..	..	..	2

26

(6.) *Island Medical Department—*

Waters	..	..	..	9
Condensed Milks	..	..	..	1
Chemicals and Drugs	..	..	..	1
Butters	..	..	..	1

12

(7.) *Medical Officer of Health, Kingston—*

	Adulterated.	Genuine.	Total.
Fresh Milks	8	10	18

(8.) *Jamaica Government Railway—*

Steam Coals	..	..	1
Creosoted Sleepers	..	..	1

2

(9.) *Special Investigation Mineral Waters Bath and Milk River—*

Waters	..	..	..	8
--------	----	----	----	---

Total Official Samples 589

"B" AGRICULTURAL.

Soils and Sub-soils	..	..	..	54
Canes and Cane Juices	..	..	..	46
Molasses	..	..	..	9
Orange Oils	..	..	..	7
Agricultural Limes	..	..	..	10
Artificial Manures	..	..	..	4
Fertilisers and Guanos	..	..	..	15
Cassavas	..	..	..	3
Bagasses	..	..	..	2

Total 150

"C" GENERAL.

Stock Farm Milks	..	..	..	547
Cattle Dips	..	..	..	65
Sugars	..	..	..	300
Rums	..	..	..	54
Waters	{ Potable	..	..	23
	{ Irrigation	..	..	8
	{ Boiler Feed	..	..	4
Fresh Milks (Private)	..	..	..	3
Condensed Milks	..	..	..	7
Animal Viscera for Poison	..	..	..	2
Substances for Poison	..	..	..	4
Medicines and Herbs	..	..	..	6
Steam Coals and Lignites	..	..	..	3
Minerals and Ores	..	..	..	15
Chemicals	..	..	..	4
Spirituos Compounds	..	..	..	5
Oils, vegetable	..	..	..	1
Oils, fixed and mineral	..	..	..	2
Wines	..	..	..	2
Miscellaneous	..	..	..	15
Total	..	..	..	1,070
Grand Total	..	..	..	1,809

OFFICIAL SAMPLES.

The 16 analysis of human viscera and organs were made in connection with nine deaths. In eight cases poison was found and recovered from the viscera as follows:—

- (1) 2 grains of a ptomaine poison found in the organs of a man whose stomach was found to contain a quantity of undigested rum equivalent in amount to 2 ounces of absolute alcohol.
- (2) 18.91 grains of arsenious oxide from the organs of a man.
- (3) 7.72 grains of opium alkaloids from the organs of a woman.
- (4) 3 grains of arsenious oxide from the organs of a man.
- (5) Hydrocyanic acid equivalent to 1.33 grains of potassium cyanide from the organs of a male suicide.
- (6) 1.6 grains of arsenious oxide from the viscera of a child.
- (7) 1.8 grains of arsenious oxide from the viscera of a child.
- (8) 1.425 grains of arsenious oxide from the organs of a man.

In the samples suspected of containing poison were found:—

- (1) Powdered glass (2 cases).
- (2) Opium alkaloids.
- (3) Nightshade (*Urechitis Suberecta*) 0.25 grains.
- (4) Extract of Opium in alcohol.
- (5) Acetate of lead, 0.25 grains.
- (6) 0.6 grains of arsenious oxide in 7 mangoes.
- (7) 1.33 grains of arsenious oxide in water.

The cases of counterfeit coins investigated on behalf of the police show that tin is commonly used in moulding spurious coins. In one case silver coins had been deiaced and gold plated in an attempt to pass them off as gold coins.

The samples examined under the Food and Drugs Law show an increase of over 81% on those examined during the year 1922. There is room for greater vigilance on the part of the police in this direction as over 33% of the samples examined were adulterated.

The Customs samples show an increase of 36 over those examined during 1922.

A large amount of work has been carried out on behalf of the Government Geologist including the complete analysis of various mineral waters, soils, ores, minerals, etc.

Mention must be made of analyses carried out for the Island Medical Department, Medical Officer of Health and the Railway.

An important investigation into the Radio-activity of the Mineral Springs of Bath in St. Thomas, and Milk River in Clarendon, was carried out during the early part of the year.

The work necessitated the investigations being carried out at the source of the springs. Some extremely interesting and valuable results were obtained. In addition a complete mineral analysis of the constituents of the waters was carried out in the Laboratory. The results obtained are given herewith as they are of general interest and importance.

Milk River.	Mineral Well.	Bath No. 1.
Temperature of water	98 degs. F.	92 degs. F.
Radio-activity in Curies X 10^{-10} per litre	12.1	135.4
Radio-activity in Maché units	3.27	36.5
Calcium parts per 100,000	75.75	60.03
Magnesium	104.64	69.49
Sodium	1192.80	784.77
Sulphate	287.20	189.30
Bicarbonate	6.71	10.06
Silica	0.80	1.20
Chlorine	2065.00	1375.00
Hypothetical Combinations, Parts per 100,000—		
Silica	0.80	1.20
Calcium bicarbonate	8.91	13.36
Calcium sulphate	250.07	192.88
Magnesium sulphate	138.70	66.61
Magnesium chloride	300.49	219.74
Sodium chloride	3033.93	1996.06
	3732.90	2489.85 Total.

The chemical analysis of the waters in Baths Nos. 2 and 3 at Milk River are the same as that in Bath No. 1. The Radio-activity however is slightly different.

	Bath No. 2.	Bath No. 3.
Radio-activity in:—		
Curies X 10^{-10} per litre	160.2	106.0
Maché Units	43.25	28.6

These results indicate that the Radio-active properties of the Milk River Mineral Spring waters compare very favourably with the waters of Spas of wide-world renown.

BATH, ST. THOMAS.

The conditions at Bath, St. Thomas are different from those at Milk River. In this case the hot mineral springs discharge their water into a central tank from whence it is drawn off as required into the various baths. The temperature of the water flowing into the main tank is 122 degs. Fah. and it possesses an activity of 4.9×10^{-10} curies per litre. This corresponds to 1.3 Maché units. When this water flows into the baths it has an activity of 4.6×10^{-10} curies per litre, or 1.2 Maché units, its temperature being 116.5 degs. Fah. It has to be cooled, usually, by the addition of cold water which is obtained from a cold mineral spring.

	Hot tank.	Cold spring.
Calcium, parts per 100,000	2.50	5.02
Magnesium	0.15	0.98
Sodium	14.80	10.45
Sulphate	11.10	3.41
Bicarbonate	1.68	10.98
Carbonate	0.60	Nil.
Silica	3.70	4.90
Chlorine	18.00	19.00
Hypothetical Combinations, parts per 100,000—		
Silica	3.70	4.90
Calcium bicarbonate	2.23	14.58
Calcium carbonate	1.00	Nil
Calcium sulphate	5.61	4.83
Magnesium sulphate	0.74	Nil
Magnesium chloride	Nil	3.84
Sodium sulphate	12.69	Nil
Sodium chloride	29.66	26.59
	52.53	54.74

The radio-activity of the water from the cold spring is very small amounting to 0.09×10^{-10} curies per litre.

The difference between the waters from Milk River and Bath, St. Thomas is worthy of note.

AGRICULTURAL.

A large number of soil analysis were carried out during the year both for the public and also in connection with Manurial experiments with canes. In addition various canes and cane juices were examined in order to ascertain the effect of various manurial treatments. Both the soil and cane analyses show a marked increase over the number analysed during former years.

A large number of artificial manures and fertilisers were examined on behalf of the public and also individual traders.

GENERAL.

547 samples of milk were analysed from the Government Stock Farm, and the results obtained show that the high standard of quality of milk supplied from this source to Public Institutions is maintained. Sugars examined show nearly a 100% increase over the number analysed during 1922.

The number of samples of Rum examined show an increase of 167% over those done in 1922.

The testing of Cattle Dips has been successfully continued throughout the year, and serves to check the field tests carried out by estate owners and penkeepers in controlling the strength of the Dip in their Dipping Tanks.

The quarterly examination of the Kingston water supplies demonstrates that Kingston is supplied with a high grade water of good organic purity.

The preparation and sale of Paranaph and other commodities to the public has continued and increased, which is shown by the appended table of amounts received for Laboratory sales.

	1921.	1922.	1923.
Paranaph	18,166	27,323	31,689 lbs.
Arsenite of Soda ..	9,453	16,170	19,442 "
Copper Sulphate ..	726	79	224 "
Carbon Bisulphide ..	1,068	463	469 "
Rat Poison (Bulk) ..	227	174	183 "
Rat poison (1 oz. packets) ..	..	245	137 packets
Thymol powders ..	400	259	507 ozs.
Standard Iodine Solution ..	20,000	39,000	45,000 ccs.

In addition to the above 58 Complete Testing Outfits were issued.

Numerous miscellaneous samples have been analysed for private individuals, and these include coals, oils, wines, chemicals, minerals, etc.

The receipts for Laboratory fees have increased over the amount received last year by £143 7/2 which is indicative of the increased amount of work done outside official analysis. The following table illustrates this.

Amount lodged in Treasury for Calendar Year:—

	1921.	1922.	1923.
	£ s. d.	£ s. d.	£ s. d.
Laboratory Fees ..	49 11 0	65 19 1	209 6 3
Laboratory Sales ..	636 17 10	1,105 15 6	1,205 9 1

Experiments have been carried out on Condensed Milk manufacture and it has been demonstrated that the manufacture of Condensed Milk is possible in Jamaica. Until further experiments have been made and more experience obtained in operating the plant to best advantage it is not possible to enter into a discussion of the costs of operation, or to forecast the commercial success of the production of Condensed Milk in the island.

The staff at the Laboratory remains the same as last year. Three apprentices are employed and these are instructed in various methods of Chemical analysis.

I have the honour to be,

Sir,

Your obedient servant,

W. LEIGH BARNETT, B.A. (Cantab.), B.Sc., F.I.C.

Deputy Island Chemist.

The Hon. Director of Agriculture, and Island Chemist,
Hope, Kingston P.O.

IX.—AGRICULTURAL LEGISLATION IN 1923.

A. LAWS RELATING TO AGRICULTURE PASSED DURING THE YEAR 1923.

Law No.	Date Assented to.	Short Title.	Chief Provisions.
14	June 11th	Rum Duty Amendment Law	(a) Prescribing conditions under which Rum in bond may be used in the manufacture of Bay Rum for sale on the local market. (b) Prescribing procedure in connection with the conversion of Rum into Industrial Alcohol.
24	June 29th	Sugar Industry Aid Loans Law, 1921, Supplemental Law, 1923.	(a) Authorising the Governor to raise a loan not exceeding £200,000 for the purpose of making loans to Sugar Planters under the provisions of Law 10 of 1921; Loans so made to bear interest at a rate not less than $7\frac{1}{4}\%$ and to be repayable in 12 months. (b) Authorising the making of Loans, not exceeding £825 to any one person, for the purchase of fertilisers for use on sugar estates. (c) Authorising the Sugar Industry Aid Board to call upon any person to whom a loan has been made to sell his sugar and rum. (d) Borrowing powers of the Governor under this Law to remain in force for 12 months only.
27	July 6th	Notices to Quit (Extension of time) Amendment Law 1923.	Principal Law (Law 47 of 1920) not to apply to land on which at time of letting there is a dwelling house or shop and no growing crops.

ORDERS, RULES, ETC. RELATING TO AGRICULTURE MADE DURING THE YEAR 1923.

Date.	Description.	Subject.
1923.		
16th January	Order under Law 29 of 1922	Declaring Estates, etc., in Westmoreland, Hanover & St. James infected with Foot and Mouth Disease.
6th February	Order under Law 24 of 1890	Prohibiting the importation of animals, fodder, etc., from Guatemala and Spanish Honduras.
6th February	Order under Law 29 of 1922	Additional Rules for regulating Movement of Animals in quarantined area.
26th February	Do do	Amending the boundaries of the infected Area in St. James and St. Elizabeth.
26th February	Do do	Prescribing "Buffer Zones" in St. James and St. Elizabeth.
28th February	Order under Law 3 of 1915	Prohibiting use of Banana Trash for wrapping ice.
26th March	Order under Law 29 of 1922	Regulations for dealing with meat, hides, etc. at Government Slaughter Yard at Montpelier.
9th April	Do do	Rules for disinfection of vehicles, pedestrians and animals on Main Roads, etc., within Infected Areas.
30th April	Rules made under Law 29 of 1922.	Rules for dealing with Swine Fever.
30th April	Order made under Law 29 of 1922.	Declaring "Nightingale Grove," St. Andrew, to be infected with Swine Fever.
30th April	Order under Law 4 of 1909.	Adding Bullet Trees (black, red and white) and Mangrove Bark (red and white) to the articles of Agricultural Produce possession of which may lead to the arrest of a suspected person.
8th May	Notice	Re shipment of Hides to United Kingdom and United States.
14th May	Order under Law 29 of 1922.	Regulating the movement of hides out of an Infected Area or Buffer Zone.
15th May	Proclamation under Law 23 of 1916	Prohibiting the importation from all countries of Coconuts in the husk.
16th May	Order under Law 3 of 1915.	Prescribing rules for dealing with Banana Trash.
10th July	Order under Law 41 of 1920.	Ordering the dipping of cattle for Tick destruction.
7th August	Order under Law 29 of 1922	Prohibiting Race Meetings within the Infected Areas.
24th September	Do do	Declaring certain properties in St. Thomas to be infected with Swine Fever.
24th September	Do do	Declaring certain areas in St. Thomas to be infected with Swine Fever.
23rd October	Order under Law 3 of 1915.	Prescribing treatment of plantations for preventing breeding of Banana Borer Weevil.
26th October	Order under Law 29 of 1922.	Revoking the "Infected Places" Orders of 1922 and 1923.
27th November	Do do	Revoking the "Infected Places" Order in respect of "Grandvale," "Forest" and "Friendship" Estates in Westmoreland.
8th December	Do do	Declaring certain Estates in Westmoreland to be infected with Foot and Mouth Disease.
10th December	Do do	Declaring a "Suspected Area" in Westmoreland.
10th December	Do do	Empowering the slaughter of cattle, sheep, goats and swine within the "Suspected" and "Infected" areas of Westmoreland.
17th December	Order under Law 3 of 1915.	Prohibiting the growing of Corn (Maize) in conjunction with Sugar Cane or in proximity to a Sugar Estate.

X.—STAFF.

Leave—Mr. E. N. Richards, Assistant to the Deputy Island Chemist, obtained 3 months vacation leave.

Mr. W. E. Watson, Accounting Clerk and Mr. J. E. Carpenter, Inspector of Plant Diseases, each obtained 2 months leave of absence.

Changes—I regret to record the death, in October, 1923, of Miss I. M. Swaby, Typist & Stenographer in the Head Office. The vacancy caused by Miss Swaby's death has been filled by the appointment of Miss I. R. Mein.

The following officers severed their connection with the Department during the course of the year: Miss I. Donaldson, Typist and Stenographer in the Head Office, Mr. C. F. Thomson, Superintendent Grove Place Stud Farm, Mr. R. A. Burgess, Supervisor, Lititz Fibre Plantation, Mr. O. L. Crichton, Inspector of Plant Diseases.

During the year the staff was strengthened by the appointment of Dr. S. Lockett as Government Veterinary Surgeon and of Messrs. A. T. Wilmot, N. A. Wainwright, H. M. King, R. G. Kirkham and W. P. Tucker as additional Inspectors of Plant Diseases.

Mr. E. U. Lewis acted as Superintendent of Grove Place Stud Farm and Mr. H. V. Silvera as Engineer at the Lititz Fibre Factory.

I desire to acknowledge the willing and effective services of the Staff during the past year in the many lines of work which now fall to the Department of Agriculture in its service to the public.

I have the honour to be,

Sir,

Your obedient Servant,

H. H. COUSINS,

Director of Agriculture.

